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LINC BOSTON II
Learning and Information Network for the Community

Comprehensive Technology Plan to Support Focus on Children II

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MISSION STATEMENT

Students and adults within the Boston Public Schools are all learners. They use technology to support and enrich their learning, as a tool to communicate, to collaborate, and to access, analyze and enhance their understanding of information. **LINC Boston II**, is a comprehensive five-year (2001-2006) plan to support the unifying goal of Boston Public Schools' education reform plan**, Focus on Children II**; "to accelerate the continuous improvement of teaching and learning to enable all students to meet high standards". **LINC Boston II** outlines a plan and the resources needed to use technology to continue student and adult learning at school, at home, and in the community, at any time of day.

1. EXECUTIVE SUMMARY FOR LINC BOSTON II

Introduction:

Boston Public Schools is facing one of the most significant changes ever in its work. The last five years have been spent building a technology infrastructure; in the next five years, that infrastructure will radically change the way we do business, in all areas from administrative reporting systems to access to educational materials, and on-line learning and communicating with families. Education today has been compared to the banking industry of the early 1980's; in a short period of time everything we knew about banking changed due to the introduction of the ATM. How well will Boston Public Schools be prepared for that radical shift?

As Boston prepares to launch **LINC Boston II**, the schools are well poised to address this shift, and to further develop a system that will give students, teachers, principals and families access to the resources they need to do their work wherever they are. Technology will be used to support the goal of **Focus on Children II**, to ***"accelerate the continuous improvement of teaching and learning to enable all students to meet high standards."*** Students will use technology to access an assignment at home or at the library and will refer back to work completed earlier in the year, as well as look up resources on the Internet and collaborate with fellow students. Teachers will use technology to share best practices with colleagues and easily access both curriculum resources and their students' records. Principals will make data driven decisions on curriculum, staffing, student support, and budget with information readily available on their desktops. Parents will be able to be active supporters of their children's learning using technology.

The technology available through **LINC Boston II** will provide vastly increased support to all of the essentials of **Whole School Improvement**. **MyBPS**, the network portal, will provide information and tools to students, teachers, principals, families and administrators in the day to day **essentials** of education. **LINC Boston II** will enable **MyBPS** to provide an improved forum for communication and collaboration among teachers as they share **best practices** and pursue **professional development** opportunities. It will give everyone from principal to teacher to family member to the student himself the ability to **review student work**, assess progress, and identify areas of needed improvement. **MyBPS** will help schools to identify and **align all resources** to support the **mathematics and literacy** instruction of all learners and will greatly facilitate **family, community, and partners' support of Whole School Improvement.**

2. TECHNOLOGY SUPPORT FOR THE SIX ESSENTIALS OF WHOLE SCHOOL IMPROVEMENT

Boston Public Schools has identified six essential elements of Whole School Improvement. Technology supports each of those essentials, as outlined below.

Essential One: Focus on Literacy and Mathematics.

In pilot projects conducted as part of **LINC Boston**, technology has played a significant role in literacy and mathematics instruction. System wide adoption of Readers and Writers Workshop and Math Investigations, Connected Math and Math Connections have been supported with AlphaSmarts, safety nets such as Scholastic's Read180, graphing calculators and focused computer teacher training for elementary, middle and high school computer teachers. Anecdotally and via research, student learning in math and literacy has been enhanced through the appropriate use of technology.

Another important accomplishment of **LINC Boston** has been the inclusion of all students including bilingual students and those with special needs in all technology initiatives. The use of assistive technologies and the universal design of all classrooms ensure that all students have access to the greatest degree possible to math, literacy and the general curriculum. Nearly 80% of the classrooms in Boston have a computer and printer and this access has made it possible to begin to reach all learners with differentiated instruction and access that students would not have without technology. Bilingual and ESL teachers have been enthusiastic participants in all LINC professional development and have created nationally recognized models for the use of technology to support the learning of both English and students' native language.

In **LINC Boston II**, all students will be expected to use the technology skills they gain to support their learning and prepare them for higher education and the workforce. It is estimated that more than 70% of jobs in today's workforce require the use of technology. Therefore, it is essential that our students use technology to write, to problem solve, to communicate what they have learned and what they need to know, and to collaborate with others to complete final projects across all curriculum areas. Students will store their work electronically so they, their teachers, and their families can chart their achievement over time. As the industry evolves, students will carry technology with them that will allow them to access their learning materials electronically, replacing the need for traditional textbooks. Students will use technology to support their career preparation, whether for specific technology careers through **TechBoston**, or for careers that use technology through School to Career.

Essential Two: Use student work and data to identify student needs, improve instruction, and assess progress.

Over the last five years, Boston Public Schools, in its own work and in partnership with others (VES, IBM Re-Inventing Education grant, BPE's Fast Track and MiDAS), has begun to develop a robust system to store, retrieve, and analyze student work and data. **MyBPS**, in the current form of **LIZA**, Local Intranet Zone for Administrators, is used by principals and

headmasters to record student attendance, track student transportation and to analyze demographic and test data for decision making. Boston Plan for Excellence has developed a companion system, FastTrack, which allows schools to develop customized reports. Each of these tools has further informed the discussion on data driven decision making. A committee, chaired by Professor Richard Murnane from Harvard, will continue to move this planning forward so all members of the BPS community have easy and accurate access to student records to improve instruction and assess progress.

A major goal of **LINC Boston II** is to make **MyBPS** available to all teachers so that they are able to retrieve data on their own classes. **MyBPS** will also have actual samples of student work; teachers across the city will be able to score and review student work with consistency using **MyBPS** and the IBM scoring tool. Ultimately, students as well as their families will have access to their own data to further their own education.

Essential Three: Focus professional development to offer teachers and principals the skills they need to improve instruction.

Whole School Improvement is dependent upon a **professional development strategy** which harnesses the power of technology to allow principals, teachers, students and families the ability to communicate, collaborate, reflect, examine and participate in strengthening instructional practice to meet every student's needs. **LINC Boston** provided the funding and momentum to involve more than 80% of BPS teachers in technology training. All of these teachers received their first computer and printer and have training to use this technology to support their teaching. The training included courses in basic computer operation, word-processing, email and Internet use. Peer coaching provided additional hours where teachers used standard suites of software to create story and character webs to support literacy instruction and honed communication and presentation skills through the use of PowerPoint. While the technology coaching model involves a finite, short term commitment of a teacher's time, a substantial by-product of the training has been to build a collegial environment in the school where teachers now meet to discuss practice long after participating in the Productivity Coaching model. Technology has driven the organization of **collaborative problem solving** groups in nearly every school; those groups can be used to further focus each school's professional development effort.

More than 40% of Boston teachers have also participated in further professional development that focused on technology integration across the curriculum. Appropriate use of technology gives teachers the opportunity to empower their instruction in ways no other tool can. **LINC Boston II** will build on the substantive training teachers have already completed, allowing them to easily transition to use online data for decision making, collaboration and the sharing of best practices, to improve instruction for all students.

Boston has been recognized for the success of its technology "coaching" model for teachers, as colleagues support one another in the use of technology. For administrators, technology must become a tool that they use comfortably to support their work. Professional development in **LINC Boston II** will offer both principals and teachers the opportunity to learn to use new technology tools to enhance all that they do. The focus of training

in **LINC Boston II** will be to use this technology to support improved instruction, especially in math and literacy. The technology-coaching model may be expanded so administrators can also have the same collegial support and sharing of best practices as they face increasing needs to use technology.

Another example of the promise of **LINC Boston II** and **MyBPS** is the scoring of student work. Through **LINC Boston** and the IBM Re-Inventing Education grant, great strides have been made in the development of a universal online scoring system. **LINC Boston II** promises to make the use of online scoring of student work part of every teacher's practice and has targeted the scoring of middle school math assessments as a priority in the next stage of development of the tool..

Essential Four: Identify best practices for instruction.

Inherent in **LINC Boston** is the belief that Boston Public Schools and its collaborating partners (universities, NEIR-TEC, TERC, EDC, business partners) have great collective understanding of how technology can be used to support improved student learning. With the **LINC Boston II** Plan, Boston Public Schools will create a powerful infrastructure, **MyBPS**, to foster communication among colleagues, share best practices, look at student work collaboratively, and build communities of learners, both within BPS and with families and partners.

In the past five years, as part of **LINC Boston** teachers have thoughtfully researched the appropriate use of technology and have shared best practices through workshops and posting information on a collaborative workspace developed by the Boston Public Schools under a U.S. Department of Education Challenge Grant. Successful teachers have opened their classrooms to their colleagues to demonstrate the integration into their curriculum. A similar need for collegial support and sharing of best practices is required for administrators .The **MetroLINC** web site and the use of virtual communities to strengthen communication and collaboration will continue to inform the development of **MyBPS** and VES.

Essential Five: Align all resources with the instructional focus.

Technology can support the effective management of **staff, schedule and budget**. Essential Five mandates that every school will creatively use all funds, regardless of the source, to advance student performance goals. It will be essential that all school-based decision making include reasonable resources to support the continued use of technology in school; in turn technology can vastly improve the management of resources.

LINC Boston provided funding to establish a web presence for the BPS. As part of this presence, a variety of online forms have now been made available to the BPS community. **LINC Boston II** and **MyBPS** will vastly expand this capability.

LINC Boston II is intended to be a comprehensive plan, recognizing that all technology elements – administrative systems as well as instructional systems and technical infrastructure –

are essential to achieve the vision expressed by **My BPS**. It is clear that district resource alignment in the areas of administrative technology; human resource management, financial management and facilities management directly impact the ability of each school to align its own resources. Great strides have been made during **LINC Boston** in all of these areas. While **LINC Boston** did not directly fund the developments of **PeopleSoft**, BPS's integrated financial and human resources management system or the **Hyperion** software system, the success of these projects is directly tied to the building of the network infrastructure and training that occurred as part of **LINC Boston** .

Boston has built a network that will support the sharing of information from classroom to classroom, school to home, and school to the world beyond. The challenge in the next five years will be to develop a system that supports more effective use of this network for **learning, communication, and collaboration.** Boston must commit resources to the development and implementation of **MyBPS** to house and integrate school and district level data on students, curriculum, finances, human resources, and facilities. All BPS students and staff will have their own unique "space" in this learning network, and will use their "virtual space" to conduct the work of teaching and learning. Full access to this space will require the city and its business partners to bring high speed Internet access to all parts of Boston and recognizing that upgrade and replacement of obsolete equipment is also essential to this effort.

Essential Six: Engage families, community, and partners to support Whole School Improvement.

Virtually every aspect of Boston's education reform efforts in and out of the classroom over the next five years will be enhanced through **technology**. It will be important for Boston to foster partnerships that give **all students** electronic access to the materials, **etextbooks and their own electronic portfolio** that they need to do their work both at home and at school. Students will begin their work in school, accessing resources on the Internet, both teacher developed and as part of a rich database of curriculum materials available, as well as using classroom materials. At an after-school program or at home, they will be able to go to their computer desktops, find the work they began in school, as well as all the electronic resources they need and show their work and class assignment to their after-school teacher or parent. Teachers and families will have access to all the material they need to help their children complete assigned projects. Families will be able to look at examples of their own children's writing or problem solving and compare them to benchmark work for students in that grade. No longer will children be penalized because their families do not have the home library of more affluent families. It will be increasingly important for all students to have access to technology beyond the school day to continue their learning. Expansion of **Technology Goes Home** to support parents' understanding of the role of technology in their children's learning, as well as increased access at libraries and community centers will be a priority for the next five years.

Conclusion:

In the first five years of the LINC Plan, significant investment was made in networking schools, upgrading electricity, and buying hardware and software. **For LINC Boston II, the total funds needed will be less, but sufficient funding must be allocated to replace obsolete equipment, to build and maintain MyBPS, and to continue and expand the technical and programmatic support needed to use technology effectively.** **LINC Boston** was successful in identifying multiple funding sources to support its ambitious plan. Boston Public Schools must identify similar resources for **LINC Boston II**. It will be important to work with the federal and state governments, external partners, and other funders to achieve the ambitious goals of **LINC Boston II**.

Boston has been recognized nationally as a leader among large urban school systems for its thoughtful development of the LINC technology plan. Boston is well positioned to take a similar role in taking technology to a new level of total integration into the work of teaching and learning. To accomplish this we must continue to harness the power of technology to align all that we do and effectively communicate our progress to all stakeholders. As the BPS is poised to implement the second phase of a system-wide communications plan, technology and the implementation of **MyBPS** is an **essential** to guarantee the success of Focus on Children II.

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3. INTRODUCTION

Since the development of **LINC Boston**, Boston Public Schools has moved from a time in 1996 when:

- there were no Internet connections.
- fewer than 10% of teachers or principals had up-to-date computers.
- fewer than 10% of teachers used technology on a regular basis at home or at school.
- students' only access to computers was in an outdated computer lab.
- schools had a 1:63 ratio of computers to students.

LINC Boston, (Learning and Information Network for the Community), is a comprehensive five-year plan to improve teaching and learning for all Boston Public School (BPS) students through the appropriate use of technology to support both curriculum and assessment. Beginning in 1995 with the work of the Mayor's Blue Ribbon Commission on Community Learning Centers, a group that involved over 150 people representing a range of expertise in business, education, and community based organizations, worked to craft the **LINC Boston** Technology Plan. As a result of the implementation of this plan, Boston has become a recognized leader among urban school districts in the effective use of technology.

LINC Boston II builds on the accomplishments of **LINC Boston** and takes bold steps to harness the power of technology to address district priorities outlined in Focus on Children II. Boston will use the infrastructure and human resources developed in **LINC Boston** to provide the entire BPS Community with technology tools to support learning and decision making.

3.1 Accomplishments in the last five years

The BPS has made substantial progress in all areas of technology implementation in the last five years. The table below shows the dramatic before and after comparisons, as well as June 2006 objectives.

Technology Area	June 1995	June 2001	June 2006 Objectives
Technology Plan	None	• June 19, 1996, the School Committee voted unanimously to accept the **LINC Boston** Technology Plan	• September 2001, **LINC Boston II** to be presented to School Committee

Technology Area	**June 1995**	**June 2001**	**June 2006 Objectives**
Networked schools	0	• Every one of Boston's schools has at a minimum a **"starter network"** (computer lab, library, principal's office, and 4 - 8 classrooms) connected to a wide area network based at BPS Headquarters, 26 Court Street • **72** schools have received a full network and complete electrical upgrade • **58** schools have at least one network connection in each classroom • All new schools are completely networked & meet state requirements for technology as they are built	• 100% of schools networked with **access to high speed data** • Review wiring schedule and standards for high school labs to support smaller learning communities and technology literacy for all students
Computer: Student ratio	1:63	• 1:5	• 1:4 with **replacement of obsolete inventory** • Increased use of newer technologies
Software	No budget for purchase	• Standard suite on all computers • Additional software budget for each school in 1997 and 1999	• Evaluate and update standard suite of software • Standardize on software to support math and literacy initiatives as well as safety nets such as Read180

Technology Area	**June 1995**	**June 2001**	**June 2006 Objectives**
Technology competencies for students	None	• Technology Competencies for students developed by a team of Boston teachers representing all grade levels including bilingual, SPED, and computer instructors, based on International Society for Technology in Education, (ISTE) National Standards • Approved July 1999, by a unanimous vote of School Committee • Integrated into curriculum • **TechBoston** Electives • School-to-Career Technology Pathways	• Evolve student technology competencies appropriately for all students • Expand **TechBoston**; training students for careers in technology • Expand School-to-Career Pathways; training students to use the technology tools of their professional pathway
Technology competencies for all teachers and support staff (i.e. nurses, guidance)	None	• Teacher Technology Competencies created by a group of teachers based on ISTE National Standards • Strongly encouraged by the Boston Teacher's Union, (BTU) • Goal for all teachers to be at "Practitioner" level	• Evolve Teacher Competencies to appropriately to support teaching and learning

Technology Area	**June 1995**	**June 2001**	**June 2006 Objectives**
Trained teachers	Small number of leaders	• School-based courses for all teachers • 80% of staff have completed 45 hrs • 30% of staff have completed 70+ hours • Technology Training Institutes for teachers each summer • Coaching Programs during school year • Computer Teachers attend specialized training	• 100% of all teaching staff will receive 45 hours of technology training and receive their first computer and printer and use **MyBPS** • Continue to grow the number of teachers to a minimum of 80%, who receive advanced technology integration training and utilize curriculum integration resources as part of **MyBPS** • Increase use of on-line courses and use of online resources such as WebQuests to train and infuse technology across the curriculum • Work with entire Teaching and Learning Team to support the integration of technology into curriculum for all BPS students and to maximize the use of limited professional development time

Technology Area	June 1995	June 2001	June 2006 Objectives
Assistive Technology	No city funded budget	• Access Technology Center at Emmanuel College first of its kind in the country • SPED Department budget for IEP's • 14 ATC Assessors trained • LINC provides computers for all substantially separate classes as teachers complete training • Adaptives provided for students as appropriate • Specialized workshops on a variety of Assistive Technology tools and strategies from low tech to high tech have trained 327 teachers providing services to over 3,700 students	• Develop stronger relationships between OIT/ATC and USS to support the process of assessing students and distributing appropriate technologies to them • Provide expertise and support to the Curriculum departments to maximize Universal Access to all curriculum • Continue to provide and expand the ATC as a resource to all constituents in need of AT services and information • Continue to collaborate more closely with OIT and Unified Student Services (USS) staff so Universal Access is considered across all training within technology
Technology in bilingual and ESL classes	Small number of leaders	• Over 160 teachers trained in workshops specifically designed for bilingual and ESL • Leadership role in National Association of Bilingual Educators, NABE	• Continue leadership role in understanding the use of technology to support the learning of non-native English speakers

Technology Area	**June 1995**	**June 2001**	**June 2006 Objectives**
Technology competencies for all staff	None	• Based on Teacher Technology Competencies, all staff are encouraged to achieve technology competencies as part of their professional development • Over 500 central office staff have participated in free courses to reach these competencies supported by business partner HIQ	• Work with Human Resources to offer technology professional development in support of job responsibilities to all staff • Provide ongoing training and support for all staff in the use of **MyBPS**
Technology to support assessment	None	• IBM grant piloted in schools for scoring student work • Local Intranet Zone for Administrators, **LIZA**, developed to give principals easy access to student data to inform curriculum decision making • The additional development of FastTrack piloted by BPE and Project Achieve piloted by 8 BPS schools indicates need for technology to support assessment	• Develop **MyBPS** to support the use of student work and data to identify student needs, improve instruction and assess progress

Technology Area	**June 1995**	**June 2001**	**June 2006 Objectives**
Web based curriculum resource bank	None	• **MetroLINC** and Web Curriculum developed • BPS takes a leadership role with development of State's Virtual Education Space, (VES)	• Deploy an interactive system, **MyBPS**, in conjunction with VES, to allow teachers to search a database of lesson plans and instructional units that have been correlated to the state and citywide learning standards
Automated libraries and trained librarians	None	• All high schools and 20 elementary and middle schools connected to one another and to the Boston Public Library. • Courses for all librarians • Online resources to support teaching and learning • Development of Library Curriculum, K-12	• Adoption of Library Curriculum by School Committee • Provide focused technology and media literacy training to library/media center staff • Work towards staffing middle school and elementary Library/Media centers with certified library staff

Technology Area	**June 1995**	**June 2001**	**June 2006 Objectives**
Technology support	3 technicians for 65,000 students	• 7 technicians • Campbell Resource Center Repair Facility with 2 technicians • Remote network support • 10 OIS Cluster support liaisons • 10 OIT Cluster support liaisons • Technology Support Teachers, (TSTs), in every school • **TechBoston** students deployed in paid apprenticeships	• Develop a policy for piloting new technologies that include realistic models for support of the technology • Address tech support issue • Use students as a resource to support technology
Access beyond the school day	None	• Extended after-school hours in many BPS libraries and computer labs across the city • Technology in all public libraries and community centers • 1400 computers donated to families through a **Technology Goes Home** partnership with HIQ • Partnerships with community- based organizations offering technology-focused after- school/summer programs using BPS-owned facilities/technology	• Continue to build links with the Boston Public Library • Expand the use of BPL online resources and catalogs in middle school Library Media Centers • Place more **TechBoston** interns in the BPL • Develop program to facilitate schools' participation in **Technology Goes Home** to increase the availability of computers to students outside normal school hours

This progress has resulted in the **LINC Boston** Plan winning the following awards:

- 1996 Macy's Leading Boston into the 21st Century Award
- 1997 Henry L. Shattuck Public Service Award, Al Lau
- 1998 National League of Cities Innovations Award
- 1998 Massachusetts Software Council Innovator Award
- 1998 John Hancock Innovations in Education Award
- 1999 Henry L. Shattuck Public Service Award, Ann Grady
- 1999 MassCUE Pathfinder, Ann Grady
- 1999 Nominee for Smithsonian Institution Innovation Award
- 2001 *Child* Magazine, Top ten cities to raise a child, indicator: computer to student ratio

3.2 Massachusetts DOE Technology Benchmarks

In May, 2000 the Massachusetts Department of Education released "Local Technology Plan Benchmark Standards for the Year 2003." These benchmarks will be used to further shape the development of **LINC Boston II**. At the current rate of funding and development, our technology plan can achieve all state technology benchmarks with the exception of the Technology Support Staffing requirement. Identifying sufficient funding for adequate technical and curricula support is our greatest challenge. Protecting and supporting the substantial investment in the physical and human infrastructure for technology is imperative for preparing our students to be contributing citizens in their community and the world. The State Benchmarks are available in PDF format on the State Department of Education's Web Site, http://www.doe.mass.edu/.

3.3 Supporting Focus on Children II: Technology Empowers Whole School Improvement

Boston Public Schools has begun to develop and implement a learning network, **MyBPS**, where data on facilities, human resources, finance, students and curricula can all be accessed and used effectively for planning and decision-making. The learning network infrastructure will enable the district to communicate, collaborate, and make data-driven decisions to improve teaching and learning for all students. **LINC Boston II** outlines a comprehensive plan, recognizing that all technology elements – administrative systems as well as instructional systems and technical infrastructure – are essential to achieve the vision expressed by **MyBPS** to support **Whole School Improvement**.

As **Focus on Children II** states, "**Whole School Improvement** is a collaborative process that leads to measurable improvement in student performance. It requires all stakeholders to look at a school's many challenges and opportunities not in isolation but in their entirety. Significant changes take place in schools only when the entire school – students, staff, families and partners – is engaged in the process. The shift from whole school change to whole school improvement reflects the district's recognition that instructional improvement must be continuous and ongoing and technology is an essential in support of that process."

According to **Focus on Children II**, "Every school will develop a **Whole School Improvement Plan (WSIP)**, which will direct all aspects of a school's work. The **WSIP** provides direction for the work of principals/headmasters, teachers, coaches, school hiring teams, the School Site Council and School Parent Council, and all outside collaborators. The Instructional Leadership Team, with the support of school coaches and specialists, is responsible for a progress review three times per year."

To achieve the mission of Focus on Children II, instructional improvement for the next five years will be organized around the **Six Essentials for Whole School Improvement.** These Six Essentials are modifications of those approved by the Boston School Committee in 1997 and have been revised to reflect the lessons that have been learned since then. The Six Essentials are:

Essential One: Literacy and Mathematics
Essential Two: Student Work and Data
Essential Three: Professional Development
Essential Four: Best Practices
Essential Five: Resource Alignment
Essential Six: Family and Community Engagement

In addition to the six essentials, there will be district-wide support for continuous improvement, safe, caring state-of-the-art learning environments, operations and business support systems, and effective, respectful communication. The many intersections of these plans follow.

As part of LINC Boston II and the Whole School Improvement process, the district will:
- develop and implement a comprehensive plan for all technology use and support (administrative, including human resources, finance, and instruction) including central office and all schools
- develop and adhere to a common understanding of technology implementation objectives to support all teaching and learning.
- develop and adhere to a shared understanding of the role of libraries and computer labs as information technology and library resources in schools.
- develop and adhere to a shared understanding of the role of computer instructors and librarians as information technology and library resources in schools.
- develop and implement a plan for the continuous replacement of outdated equipment.

As a result of Focus on Children II and LINC Boston II, students will:
- use a range of low to high technology tools and strategies that ensure Universal Access to a standards-based curriculum, e.g. use portable devices to support improved writing.
- answer "what if" questions in Math and Science using graphing calculators and spreadsheets.
- support research with a vast array of Internet based databases.
- store their work in electronic portfolios.
- use the Internet for education, communication and collaboration.
- have access to teachers and schoolwork outside the school day.
- be prepared to enter higher education and the workforce world with high level of technology proficiency and skills.

As a result of Focus on Children II and LINC Boston II, teachers will:

- with a single point of entry on their computer, take attendance, score student work against agreed upon rubrics, review students' performance history and check their own human resource data.
- communicate and collaborate with colleagues, administration, parents and the community.
- research and share best practices.
- infuse their curriculum with technology to provide differentiated instruction for improved student performance.
- develop web-based delivery of lessons, curricula and assignments.

As a result of Focus on Children II and LINC Boston II, school-based administrators will:

- review student performance data, attendance, and health records online in preparation for discussion of student work with teachers and families.
- communicate and collaborate with colleagues, parents, business and community partners.
- research best practices in teaching and learning.
- access and manipulate data for staffing, budget, facilities and program planning.

As a result of Focus on Children II and LINC Boston II, Central Office Administrators will:

- recruit, select, and assign new staff with a paper-less tracking system.
- implement and track professional development for all staff using a mix of technology based and offline delivery systems.
- support information flow and decision making through the use of an integrated technology system used by the Finance, Budget and Operations Units.
- make data driven building maintenance, space planning and capital planning decisions using a system-wide, web-based facilities information management system.

As a result of Focus on Children II and LINC Boston II, families will:

- access information on their own children's work online.
- communicate and collaborate with their children's teachers over the Internet.
- connect with community resources that support their children's education.
- access training and information to connect their family with resources in the community.

4. ESSENTIAL ONE: TECHNOLOGY SUPPORTS LITERACY AND MATHEMATICS, FOCUS ON STUDENT GOALS

Blind students at English High School are mainstreamed for all their courses. They use portable writing devices for taking notes in class, and then take those same devices home to complete their home assignments. They print out their work, in Braille for themselves and in regular print for their teachers. Their geometry teacher uses an embosser to print out geometry assignments; the embosser raises the paper so the students can "feel' the diagrams, and prints out the angles in Braille. After the school day, these same students can email their fellow sighted classmates to discuss their homework, form relationships and become part of the community of learners in their school.

4.1 Overview

With the increased use of technology in all areas of our lives, "encouraging and supporting the acceleration of academic achievement for every student, in every school, in every classroom across the district", must include mastery of specific technology proficiencies. All students must acquire the "new basic skills" for the information age -- the ability to access, analyze, and communicate information. In order to achieve this result, Boston Public Schools has identified appropriate technology competencies and is integrating these competencies into all curriculum areas, with a focus on literacy and mathematics.

These competencies demonstrate increasing student adeptness in the following basic areas:

- Technology awareness -- addresses the application of technology for personal and societal use
- Technology identification and operation -- focuses on the effective operation of computers, printers, and peripherals
- Application of appropriate technology -- emphasizes the use of common technology tools (e.g., word processing, spreadsheets, databases, telecommunications, and graphics software)
- Skill development
    Academic -- aligns appropriate technology resources with traditional content areas
    Cognitive -- highlights the use of technology to enhance problem solving, data analysis, and personal creativity
- Acquisition of information (research) -- incorporates technologies (e.g., CD-ROM, DVD, networks, media centers, etc.) to allow students to reach beyond BPS boundaries
- Presentation/production skills -- centers on the ability to communicate an idea in a persuasive fashion using a variety of resources, techniques, and approaches
- Ethical use -- addresses the acknowledgment of the ownership of ideas as well as security and copyright issues
- Occupational technology – identifies and builds expertise in technologies associated with the world of work, career opportunities, and the practical application of the sciences

4.2 Goal for the next five years

Develop and adhere to a common understanding of technology implementation objectives to support all teaching and learning.

Boston Public Schools has addressed this goal by grouping mastery of technology proficiency with a focus on literacy and math, in three broad areas;

- core technology competencies to be achieved by all students,
- technology integrated, as appropriate, in all curriculum areas, and
- the opportunity for middle and high school students to study technology in depth as preparation for industry standard exams and/or careers in technology.

In addition, all classrooms will be designed to insure **Universal Access** to standards-based curriculum through a range of low to high tech tools. Students, whose first language is not English, can make the transition to English learning as they access information electronically in their native language and communicate to others in English.

4.3 Core Technology Competencies

In September 1998, a team of Boston teachers representing all grade levels including bilingual, SPED, and computer instructors developed a set of Student Technology Competencies, based on the standards recommended and recognized nationally by the International Society for Technology in Education. The Competencies are directly connected to the Citywide Learning Standards and were passed unanimously by the School Committee in July 1999 as conditions for promotion and graduation. The Student Competencies are available on the BPS Web Site, http://boston.k12.ma.us.

As an exit requirement, for grades 5, 8 and 12, all students must achieve core technology competencies. It is the responsibility of principals/headmasters to ensure that scheduling is arranged to give all students appropriate opportunity to achieve these competencies. Lists of the approved technology courses are available on the OIT Web Site, select **Teaching and Learning** and then, select **Technology**. Students with unique learning needs will become facile with appropriate Assistive Technology tools/software which ensure their access to a standards-based curriculum and promote their success and independence, both in school and in the community. A 63 hour, technology literacy course is a graduation requirement at the high school level. The syllabi will be available on the OIT Web Site, winter 2001.

4.4 Technology Integration

Boston Public School teachers involved in the KidsSmart-WriteSmart-AlphaSmart project are excited. They are excited about their own professional development and how easy this tool is to use with students. They are also seeing in a short time frame how this tool is giving some children an outlet to become writers. Many of our teacher teams are also involved in the BPS Curriculum Department training of "Writers Workshop". OIT and Curriculum departments have had discussions about how and where the AlphaSmart fits into this training model. It was agreed that teachers needed to establish quality technology enhanced models within the Writers Workshop format.

As part of achieving their technology competencies, teachers are expected to develop and implement curriculum units using technology as a tool in their teaching. While all K-12 staff have been targeted for technology training across the curriculum, the training models have been aligned for the greatest impact on math and literacy across the curriculum. One example is our AlphaSmart Project. The use of AlphaSmarts in collaboration with Writers' Workshop illustrates the dynamic impact that technology can have to bring about observable changes in the teaching and learning environments. In **LINC Boston II**, many additional points of intersection between curriculum and technology will be identified and targeted for implementation.

4.5 TechBoston and Preparing our Students for Careers in Technology

Middle and high school students have an opportunity to study technology in depth, as preparation for industry standard exams and for careers in technology. Students preparing for other careers will use technology, as appropriate, in that career preparation. School-to-Career and **TechBoston** have developed exemplary programs to meet these goals.

TechBoston, http://TechBoston.org
Established in 1998, **TechBoston** is a partnership of the Office of Instructional Technology and School-to-Career whose mission is to train Boston Public School teachers to offer higher-level computer courses in our middle and high schools. To date, the program has trained 150 Boston Public School teachers in Robotics, Web Design, 3Com and Cisco Networking, Microsoft Office, A+ Hardware, and Microsoft Certified Systems Engineering. Teachers work with **TechBoston** staff to create and align curricula to the Boston Public Schools Learning Standards, the School-To-Career Competencies, and the BPS Technology Competencies. The curriculum is rich in project-based activities designed to produce signature projects for the students and an active learning process for all.

The **TechBoston** Program is in 13 high schools and 10 middle schools. The 1500 Boston Public School students are 45% female and 55% male, a sharp contrast from when the program first began and had a 20 % female population. **TechBoston** also serves a diverse population, with 45% African American; 25% Hispanic; 20% White; and 15% Asian students. The overall percentage of students qualifying for free and reduced meals is 62% with 9% qualifying for reduced-price meals. In addition to taking courses during the school day, students may also participate in programs after school and on Saturdays. In its first year, 11 out of 12 students passed the first level of networking certification through NACSE, among the first students to pass this exam in the country.

Internships and work in the community are strong foci of the **TechBoston** Program. During their sophomore and junior years, students are encourage to apply what they learn in their **TechBoston** classes by securing internships in local businesses and community-based organizations both for the summer and for during the school year. Students perform technical support in the Boston Public Library, 20 different Community-based Organizations, and various businesses throughout Boston. **TechBoston** is also developing models of support for the Timothy Smith Centers, the YMCA, Boys and Girls Clubs and within their own school buildings.

TechBoston Academy

Boston Public Schools plans to open a new small high school, called **TechBoston** Academy (TBA), in September of 2002. **TechBoston Academy** was developed based on the success of **TechBoston** in individual high schools and the demand on the part of Boston students and families for additional small high schools. The development of the proposal for TBA was accomplished through a joint collaboration between the Boston Public Schools and the Gates Foundation, which, through its Model Secondary Schools Project (MSSP), provided planning support and seed money to the proposed school. This high school will have at its core, learning about and using technology to support all of a student's work. The development of TBA stemmed from the recognized need by educators and other stakeholders for small high schools that can offer students more personalized opportunities for learning, meaningful relationships with adults, a longer school day with blocks of time for deeper engagement in learning, experiences in job settings and in the community linked to school-based learning, and a longer school year that is divided into trimesters. **TechBoston Academy** seeks other partners to contribute the additional funds critically needed for the purchase and renovation of a school site, and for the technology, professional development, and curricular and program enhancements. Core operating support for the school will come from the Boston Public Schools.

The mission of **TechBoston Academy** is to accelerate student learning through the integration of technology throughout core academic subjects (Humanities and Science). TBA faculty members will introduce and use technology as an instructional tool and as a subject for learning. Students will have multiple and diverse ways to explore, learn and create with the overall emphasis placed on student-centered learning that is rigorous, engaging and linked in meaningful ways to their interactions and experiences in the business and local communities. Teachers, parents and community members will work together to serve as guides and coaches while students will be the primary workers in the school's learning enterprise. Groups of students will study and work together to develop solutions to real-life problems and receive the opportunity to present their major projects as exhibitions to outside panels of experts. Through these experiences, students will be able to evaluate their own work against clear, objective and publicly accepted criteria.

School-to-Career

The BPS has had a nationally recognized School-to-Career (STC) structure in place since 1994. Beginning in 1994, four BPS high schools became school-to-career schools. To date, 11 BPS high schools are designated STC high schools. This designation means that these high schools

have career pathways in which students enroll. Career pathways are linked to viable industries such as business, health and technology. Each school has created different pathways so that there will be choice for all BPS students, with the recognition that all students are different and that each student has unique assets, potentials, skills, interests, dreams and needs. Each career pathway involves classroom-based learning that is connected to the pathway's particular industry. Students engage in a work-based experience in the community that is connected to the pathway industry. To round out this structure, the school-based curriculum is linked to the skills needed by the industry, and while students are engaged in their work placement, academic skills are also reinforced.

Over the past five years, technology has become increasingly integrated into all career pathways as an instructional tool and as a subject for learning. This was purposefully and thoughtfully planned to ensure that the career pathways provide all students with opportunities to reach their full potential in any area of the industry represented by their pathway, and to ensure that their academic and literacy skills improve. Students have begun to use electronic portfolios to document their work and to self-assess their own progress by reviewing their work over time and through the electronic medium. Students involved in School-to-Career pathways show marked improvement in attendance and punctuality at school, and at work-based experiences, increased completion of projects and homework, and an increase in the level of participation during classes and work experiences over the non-school-to-career students.

4.6 Design of All Classrooms for All Students

Supported by city, state and federal government funds, the BPS has played a leadership role in promoting Universal Access to the standards-based curriculum through a range of low to high tech tools. Universal Access is achieved in two ways:

- Universal Design strategies and tools are applied to a broad range of users at the classroom level, both in regular education and special education, and
- Assistive Technology, (AT), assessments of students through the IEP process ensure that customized strategies and tools are provided to address unique student learning needs.

Boston has also played a leadership role in understanding the use of technology to support the learning of non-native English speakers (36% of BPS students are language minority). Teachers and central office staff have developed curriculum workshops for Bilingual and ESL teachers. The workshops have empowered teachers to assume leadership roles in their schools and to understand how to better support students' learning of English, as well as strengthen their native language and knowledge of their culture through Internet access to their countries of origin. Boston has been recognized for its work by the National Association of Bilingual Educators (NABE) and now fills leadership roles in that organization.

Both bilingual and special needs teachers are represented in numbers beyond their percentages in the system, in BPS workshops and coaching opportunities. Since each teacher who successfully completes a coaching program, receives technology for her classroom, BPS guarantees that special needs and bilingual students have access equal to that of regular education students.

Students in BPS Strive Program (a School-to-Career program for students with more severe needs) staff a computer-recycling program for the BPS where they learn to recycle and refurbish donated computers. Revitalized equipment is distributed back to students with special needs for their homes. Over 300 restored computers have been given out in the program's first year of operation. **LINC Boston II** will continue the conscious effort to include teachers of students with special needs and bilingual/ESL teachers in all its workshops and coaching opportunities.

Access Technology Center at Emmanuel College

The mission of the Access Technology Center at Emmanuel College (ATC) is to promote teaching and learning for *all* children with the assistance of technology. The Center's primary goal is to provide specialized technology and training opportunities for teachers to create an enriched learning environment which enables students to meet the BPS learning standards. These innovative uses of technology promote student success and independence.

The ATC has been in operation since 1984 and was the first of its kind in the United States. During the past 17 years, ATC has trained teachers, provided technology, and maintained a strong presence in the field of Assistive Technology. Prior to **LINC Boston**, the ATC had minimal funding and depended almost solely on private donations and grant funds. Following the adoption of **LINC Boston**, the ATC has been supported with stable funding through general school funds and supplemented by external funds. Funding for ATC has come from the Office of Instructional Technology (with support from Unified Student Services), providing a staff of 2.4, needed training and professional development for teachers, and purchase of hardware and software that serve both general classroom and individual student needs. The staff of ATC writes grants and solicits foundations for monies to support the Center. The ATC has made substantial contributions during the past five years and will continue to evolve with **LINC Boston II**.

4.7 What every school will achieve through Focus on Children II:

(As outlined in the Focus On Children II document).

- ✓ The principal or headmaster and the Instructional Leadership Team will ensure that the Literacy and Mathematics Plans are implemented consistently across all classrooms and in all subject areas.
- ✓ The literacy and mathematics curricula will be made understandable to all teaching and non-teaching staff.
- ✓ Literacy and mathematics coaches and specialists will support teachers in strengthening instructional practices.
- ✓ Students who are furthest behind in literacy and mathematics will receive additional instruction and support through Transition Programs for grades 3, 6 and 9.

4.8 LINC Boston II steps that support Essential One:

- Evolve student technology competencies appropriately.
- Increase the use of electronic portfolios.
- Continue to work with Curriculum and Instruction to define additional points of intersection between curriculum and technology for increased student performance in math and literacy.
- Develop and grow **TechBoston**.

- Continue to seek support to increase technology-related aspects of current School-to-Career pathways and to develop new technology-specific pathways.
- Increase the BIZ TECH model especially the aspect of student-developed business plans.
- Develop stronger relationships between OIT/ATC and USS to support the process of assessing students and distributing appropriate technologies to them.
- Provide expertise and support to the Curriculum departments to maximize Universal Access to all curriculum.
- Continue to provide and expand the ATC as a resource to all constituents in need of AT services and information.
- Continue to collaborate more closely with OIT and Unified Student Services (USS) staff so Universal Access is considered across all training within technology.
- Work with schools to inform their practice in planning for students with diverse learning needs.
- Continue leadership role in understanding the use of technology to support the learning of non-native English speakers.
- Expand the AT Assessors training project to enable timely and efficient assessment of students.
- Develop better outreach to staff, students, and their families to inform them about the systemic approaches to assistive technologies.
- Post resources on a web site to allow greater access to information from all constituents.
- Develop an assessment library for AT assessors so they can match technology supports to student needs.

4.9 Challenges to be addressed in achieving those goals:

Continued funding is critical to sustain and expand the use of technology to support math and literacy for all students. The partnerships already established with the Math Department, Unified Student Services, School-to-Career and Bilingual can serve as models for this improved collaboration. Continuing and expanding collaboration and communication with other BPS departments and partners who share the same goals is essential to supporting the effort.

Equally challenging is finding the appropriate balance between schools' wishing to pilot new technologies. A need exists for central establishment of technical, programmatic standards, and the need to limit the range of technologies approved for use so the BPS can adequately support the technologies that are used by its community of more than 100,000 potential users. Appropriate use of technology in support of math and literacy requires consistent, systemic adoption across the network for the greatest impact on student performance.

5. ESSENTIAL TWO: TECHNOLOGY SUPPORTS THE USE OF STUDENT WORK AND DATA TO IDENTIFY STUDENT NEEDS, IMPROVE INSTRUCTION AND ASSESS PROGRESS

In 1996, a principal could communicate with the central office by phone or fax, and then had to wait for large stacks of paper reports containing student test scores to arrive. Central office memoranda were delivered by courier and distributed to each teacher. Teachers completed attendance and reports on paper and had student "runners' who brought them to the office. Much has changed in five years. With the installation of a network connected to the Internet in each of Boston's 131 schools, email communication is routine, the Boston Public Schools web site hosts all of the memoranda previously sent in paper copies, and principals have immediate access to student test scores, attendance, transportation, and health records within 24 hours after a student transfers to that school. In SY2001-02, teachers will begin to have similar access to their own students' work, and in subsequent years, families and students will be able to access all of their own work and records.

5.1 Overview

A major goal of **LINC Boston II** is to make **MyBPS,** a secure network portal, available to all members of the BPS community to support their work. Boston Public Schools, in its own work and in partnership with others, VES, IBM Re-Inventing Education grant, and BPE's Fast Track, has begun to develop this robust system to store, retrieve, and analyze student work and data. **MyBPS**, in the current form of **LIZA**, (Local Intranet Zone for Administrators), is used by principals and headmasters to record student attendance, track student transportation and to analyze demographic and test data for decision making. Boston Plan for Excellence has developed a system called FastTrack that has customizable reports for schools; this work has further informed the discussion on data driven decision making. A committee, chaired by Professor Richard Murnane from Harvard, will continue to move this planning forward so all members of the BPS community have easy and accurate access to student records to improve instruction and assess progress. As part of **MyBPS**, teachers, students, and families will be able to assess student work and view exemplars using agreed upon rubrics and benchmarks. Ultimately, students and parents will have access to their own students' work and test scores.

To build **MyBPS**, the creation and maintenance of a robust network infrastructure must be a priority. A parallel activity in developing the network infrastructure is to establish guidelines for appropriate use of the network. An **Acceptable Use Policy** and a committee that meets regularly to review policy were instituted as part of **LINC Boston**. The AUP can be viewed on the BPS web site.

5.2 Goals for the next five years

- ***Develop and implement a comprehensive plan, including the deployment of MyBPS, for all technology use and support, both administrative and instructional, for central office and all schools.***

- ***Develop and implement a plan for the replacement of outdated equipment and for upgrading and expanding the BPS network..***

5.3 MyBPS

MyBPS, the **Intranet** network portal, will provide information and tools to students, teachers, principals, administrators and families in the day-to-day essentials of education. The **Internet** is where the public can view general information about the BPS. The **Intranet** provides **secure data** to each user based on her specific needs and authorization. **LINC Boston II** will enable **MyBPS** to provide an improved forum for **communication and collaboration** among teachers as they share best practices and pursue professional development opportunities. It will give everyone from principal to teacher to family member to the student himself the ability to **review student work**, assess progress, and identify areas of needed improvement. **MyBPS** will help schools to identify and align all resources to support the mathematics and literacy instruction of all learners and will greatly facilitate families, communities, and partners support of **Whole School Improvement**.

As an individual logs in or signs on to **MyBPS**, the unique or universal log in will **authenticate** that user for all areas of **authorization**. The authentication process is a measure used to keep **all data secure**. Administrator, teacher, student, or family member will be able to access the home page of the Intranet and proceed to only those areas that they have been authorized to view. Central BPS staff will be identified as owners responsible for providing updated information in each content area. For example, Research and Assessment will articulate when new scores are available, Curriculum and Instruction will be responsible for updating standards current and Human Resources will own keeping employee records current. Each content area will determine appropriate authorization for their data and guidelines for its use.

5.4 MyBPS Design Matrix

MyBPS is currently available as a pilot in several areas; **LIZA**, **MetroLINC**, the Mass Dept. of Ed's VES and the IBM Reinventing Education Grant. Boston Public Schools also has a major administrative system and is working to connect it to the State IMS System. OIT and OIS are working in close collaboration with the VES design team and work groups to ensure district alignment and the ease of information sharing, as the system becomes viable. The goal is to identify a portal that will facilitate a unique identifier for every user. The unique identifier will allow that user access to all-appropriate information and tools. The portal must be open and interface with systems already in place. The proposed phase of development is as follows:
Phase 1: (November 2001) Teachers will have access to **LIZA** to view their own students' information.

Phase 2: Principals and teachers will have access to BPS calendar, all BPS information, email, and **LIZA** with one logon.
Phase 3: Teachers and others will develop and share curriculum, lesson plans, and assessments.
Phase 4: Students will be part of **MyBPS** and will access their work anywhere, any time via the BPS Intranet. Teachers will score student work on-line using agreed upon rubrics, giving system-wide consistency
Phase 5: Families will be part of **MyBPS** and will view their children's work, access BPS information, and communicate with teachers
Italics**=currently available**
The following Matrix outlines the areas of potential development for **MyBPS**.

MyBPS Student (65,000)	**MyBPS Teacher (6,000)** (Teacher, librarian, para, etc.)	**MyBPS Administrator (500)** (Director, Principal, Central Office Staff)	**MyBPS Family (45,000)**
Communication & Collaboration: ***Email***, IP conferencing Collaboration, virtual hard drive Web publishing and hosting BPS Memoranda, student handbook, Voice mail	**Communication & Collaboration:** ***Email***, IP conferencing Collaboration, virtual hard drive Web publishing and hosting BPS Memoranda Voice mail	**Communication & Collaboration:** ***Email***, IP conferencing Collaboration, virtual hard drive Web publishing and hosting BPS Memoranda Voice mail	**Communication & Collaboration:** ***Email***, IP conferencing BPS Memoranda, student handbook Voice mail
Productivity Tools: ***Reference Tools*** ***Desktop Tools, Standardized Applications, Office, Inspiration, etc.*** Resource Tools	**Productivity Tools:** ***Reference Tools*** Desktop Tools, Standardized Applications, Office, Inspiration, etc., Resource Tools	**Productivity Tools:** ***Reference Tools*** ***Desktop Tools, Standardized Applications, Office, Inspiration, etc.***Resource Tools	**Productivity Tools:** Reference Tools, i.e. online resources
Instructional Management: Calendar; school year and ability to customize Shared Calendar, agendas or assignment books, portfolio, report card	**Instructional Management:** Grade Book Calendar; school year and ability to customize Shared Calendar Planner; ability to plan multiple classes Journal, feature related to reflective practice, Student Interface; ability to put assignments in individual student "agendas"	**Instructional Management:** Calendar; school year and ability to customize Shared Calendar Journal, feature related to reflective practice	**Instructional Management:** Calendar; school year and ability to customize, Access to own child's data from **LIZA** View child's agenda or assignment book View child's work in Electronic Portfolio, Report Card
Instructional Design: View course Syllabi	**Instructional Design:** Post Syllabi Teacher's Lesson Plan Course, Unit Lesson, Activities	**Instructional Design:** View course syllabi	**Instructional Design:** View course syllabi

MyBPS Student (65,000)	**MyBPS Teacher (6,000)** (Teacher, librarian, para, etc.)	**MyBPS Administrator (500)** (Director, Principal, Central Office Staff)	**MyBPS Family (45,000)**
Curriculum Management Tools: View State Curriculum Frameworks View Boston Citywide Learning Standards View Assessments, MCAS, SRI, Stanford 9, etc.	**Curriculum Management Tools:** **WSIP** View State Curriculum Frameworks View Boston Citywide Learning Standards View Assessments, MCAS, SRI, Stanford 9, etc.	**Curriculum Management Tools:** **WSIP** (Whole School Improvement Plan) State Curriculum Frameworks Boston Citywide Learning Standards Assessments, MCAS, SRI, Stanford 9, etc.	**Curriculum Management Tools:** View **WSIP** View State Curriculum Frameworks View Boston Citywide Learning Standards View Assessments, MCAS, SRI, Stanford 9, etc.
Human Resource: Internships Employment through School-to-Career or **TechBoston**	**Human Resource:** PeopleSoft Classification Sick, vacation, personal days Benefit package Professional Development	**Human Resource, Finance & Budget:** ***PeopleSoft*** Classification Sick, vacation, personal days Benefit package Professional Development	**Human Resource:** Approved budget
Administrative Management Tools: Saftey Plans Transportation Student Assignment Food Services	**Administrative Management Tools:** Saftey Plans Transportation Student Assignment Food Services	**Administrative Management Tools:** *LIZA*, Safety Plans Transportation Student Assignment Food Services Student Discipline School Profile and Inventory	**Administrative Management Tools:** Safety Plans Transportation Student Assignment Food Services

5.5 Network Components

The success of **MyBPS** is heavily dependent on Boston's ability to build, maintain and enhance a robust network. In June 1995, Boston had a 1 to 67 computer to student ratio. Since that time, **LINC Boston** has guided the installation of 13,000 additional workstations. Our goal is to have one computer for every four students and a computer for each teacher. We are now at a 1 to 5 ratio and support a dual platform of Mac and PC workstations throughout the city.

As a result of the **LINC Boston** Plan, the BPS Community has seen a dramatic increase in the availability of technology to its students and teachers. There are now over 13,000 computers and the district is on track to meeting Mayor Menino's commitment to reaching a 4-1 student to computer ratio. In addition, in grade appropriate classrooms there are many projection devices, graphing calculators and keyboarding devices to support student writing. Each school now has a network server and routers for access to the BPS and Internet and printers. A range of low to high

Assistive Technology tools and software has been deployed to self-contained special needs classrooms and to individual students with disabilities.

All computers come with pre-installed, licensed software. K-12 machines all have Microsoft Office and Inspiration. K-8 machines also have Kid Pix, ClarisWorks/AppleWorks and HyperStudio. K-5 machines have licenses for School Font, while middle and high school machines may use Math Type. All machines use Norton Anti-virus. The district focus is on tool software and not on the use of Integrated Learning System software or drill and practice materials. In addition to the tool software that comes with every machine, schools received a small software budget in 1997 and 1999 to supplement their software libraries. The BPS purchases all software with a license for each machine and pre-loads all software before it is deployed. When additional software titles are selected as citywide standards, Tech Support Teachers assist in assuring that appropriate computers are upgraded and that individual users understand BPS licensing policy.

The Office of Instructional Technology has introduced AlphaSmart Keyboards to teachers and students in grades 3 & 4. This project is partially funded by The Massachusetts Department of Education through the Adopting Best Practices Grant, the **MetroLINC** Technology Innovation Challenge Grant and matching funds from the district. AlphaSmart keyboards are word processing devices which function as writing pads with the ability to download files to a computer for further text editing and formatting or to a printer for direct printing. Graphing calculators are used as part of the middle and high school math curriculum.

The print world and software companies are in transition. The District continues to monitor both worlds to provide appropriate resources to support teaching and learning. Currently access to a variety of electronic resources is available at school and at home. The services are listed on the BPS web site for easy reference.

BPS accepts donations of late model computers that are in excellent working condition and that can be supported. Any school wishing to accept a donation must have that donation pre-approved by the Office of Information Services and must have funding to purchase **all** required software licenses for the machines.

A Hardware/Software Committee comprised of representatives from the Office of Instructional Technology and the Office of Information Services makes all decisions on hardware and software purchases. Any vendor wishing to work with the BPS must submit their hardware or software for review. Decisions are made based on the instructional goals of the school, the specifications of equipment required to support these instructional goals and the ability of the BPS to support that equipment. Schools wishing to purchase hardware or software with non-LINC funds are strongly encouraged to have all purchases reviewed by the Hardware/Software Committee. OIT and OIS may not support purchases and decisions made in isolation of the committee. Purchasing Guidelines are now posted on the BPS web site. The Committee meets regularly to review new technologies.

By the year 2003, more than 90% of all BPS Staff will have participated in more than 60 hours of technology training sponsored by the Office of Instructional Technology. The training is provided at no cost. Teachers also receive computers and other technology for their classrooms as they complete professional development. The Boston Public Schools equipment deployment policy is as follows:

Equipment associated with professional development opportunities must align with the school's technology plan and not exceed LINC Technology Plan maximums as follows:

- Not more than 4 computers per classroom for full classes

Class size	# of computers
1 - 6	1
7 - 12	2
13 - 18	3
19 - +	4

This is a total allocation for all **LINC Boston** Projects

- no more than one printer for a classroom (not including labs)

Please note:

- all equipment awards are subject to funding
- all equipment is linked to professional development
- during the school day all computers must be available for student use
- should the teacher transfer to another school, the equipment will follow (class size restrictions apply)
- should the teacher be reassigned to a non-classroom based position, or leave the system, the equipment must be returned to the Office of Technology for redeployment.

5.6 Technical Support of the Network

Boston is working to ensure that every administrator, teacher and student receives high-quality user and system support. Technical support is provided through a centralized Help Desk, remote update of systems, on-site repair of equipment, a centralized repair facility, training for teachers in trouble-shooting equipment, and school-based staff who support equipment. Technical support is Boston's greatest challenge, given the large number of computers in the system (approx. 13,000 as of June 2001).

The Office of Information Services, (OIS), operates a centralized Help Desk for all staff. All equipment that is serviced by the Help Desk must be in the central inventory, (BPS Inventory Stickers, Asset Tags), and must meet the Minimum Report & Support Standards. The Minimum Report & Support Standards, as well as Help Desk Procedures can be found on the BPS Web Site.

The OIS Computer Repair Center is a service located at the Campbell Resource Center, 1216 Dorchester Avenue, Dorchester. Schools must call the **OIS Help Desk (635-9200)** to schedule all repair services. Computer equipment may be brought to the Repair Center between 8:00 a.m. and 4:00 p.m. The Repair Center is for Boston Public School equipment only (with inventory

stickers), and the equipment **must** meet the Minimum Repair & Support Standards. Upgrades of hardware/software are not the responsibility of the Computer Repair Center.

In conjunction with the Office of Information Services, the Office of Instructional Technology has developed a corps of school-based Technology Support Teachers, (TSTs). These teachers provide up to 5 hours per week of **tech support and curriculum integration** guidance at their own schools. They triage and trouble shoot basic technical problems before calling the citywide Help Desk for more technical support. Currently we have 1 full time technician to every 532 machines. While the Tech Support Teacher is primarily hired to support curriculum integration, the school-based nature of the program has helped to alleviate some unnecessary help desk calls.

5.7 What every school will achieve through Focus on Children II:

(As outlined in the Focus On Children II document).

- ✓ All staff will be trained to examine, evaluate, interpret and discuss student work.
- ✓ Criteria for evaluating student work will be used consistently throughout the school and will be understood by staff, students and families.
- ✓ Every student will be tested in reading, writing and mathematics three times each year. Teachers will use this performance data throughout the year to map the necessary steps for moving students from where they are to where they need to be.
- ✓ Teachers will use year-end standardized test data (Stanford 9 and MCAS) to identify students' strengths and gaps and modify instructional practices accordingly.

5.8 LINC Boston II steps that support Essential Two Goals:

- Reach the Mayor's Goal of 1 computer for every 4 students.
- All classrooms will be connected to the Internet.
- The major technology that will be deployed over the next five years will be desktop computers, although the district is pursuing wireless options as well as AlphaSmart technology to empower writing across the curriculum.
- Expand the use of low to high tech tools, portable word processing devices (like AlphaSmart) to encourage the writing process across the curriculum.
- The intensified focus on math will also necessitate a renewed focus on graphing calculators.
- Continue to deploy software and hardware in support of district teaching and learning priorities. Consider deployment of resources to specific grades and departments to address specific curriculum and instruction programs.
- Develop a policy for working with vendors.
- Develop a policy for piloting new technologies that the Plan can support.
- Continue exploration and use of online resources.
- Develop **MyBPS** to support the use of student work and data to identify student needs, improve instruction, and assess progress.
- Provide ongoing training and support for all staff in the use of **MyBPS**.
- Work with the Harvard Medical School and other partners to explore the use of Internet-II ultra-high speed networking for distance learning, interactive video, and other applications.

- Monitor evolving technologies for inclusion into the BPS procurement standards including laptop and handheld devices for 1 to 1 student use, wireless networking, voice recognition and new revisions of standard software packages.
- Review wiring schedule and standards for high school labs to support smaller learning communities and technology literacy for all students.
- Address tech support issue.
- Use students as a resource to support technology.

5.9 Challenges to be addressed in achieving those goals

Until all classrooms are networked, data use and data driven decision making for all teachers will be a challenge. Internally, schools that elect not to follow guidelines and users who do not complete appropriate training have the potential to drain momentum and limited financial and human resources. The use of technology requires systemic strategic deployment and planning in order to successfully provide services to support all users. Adherence to a common vision of technology use and deployment is critical as we move forward.

Adding a level of complexity to the scenario is the ever evolving world of technology itself. Dealing with vendors and new products is a daily task that has the potential to hinder progress and drain valuable resources already earmarked for creating the necessary technology foundation and infrastructure. The updating of obsolete equipment must be addressed in a way that does not remove opportunities for those at the end of the line to receive their technology. The BPS must have a unified plan to ensure that every department adhere to guidelines of the Plan when undertaking pilots or making purchases with non-LINC funds.

The potential of a city-wide fiber network provided by one of the cable franchises offers some possibilities to address the continuing need to upgrade the Wide Area Network capability but neither its technical specifications nor implementation schedule are clear at this point. In addition to the opportunities presented by the cable franchise agreements, the evolution of increased openness and competition in the telecommunications market also promises a broader range of more powerful and cost-effective products from commercial vendors. The City of Boston is also installing its own private fiber network in certain locations that is becoming available to the BPS as the network is rolled out.

The BPS must maintain a tactical flexibility in its telecommunications initiatives in order to take advantage of the opportunities presented and not be caught with long-term commitments to obsolete or no longer viable services or companies. In practice this means entering into short-term commitments to pilot new technologies as they present themselves while proceeding cautiously on long-term commitments for operational systems.

Another challenge which must be addressed is having the infrastructure in schools available as schools make programmatic changes (e.g. high schools broken down into small learning communities necessitating adding labs). Keeping pace with appropriate technologies in our high schools is a particularly daunting task. Providing computer literacy for all students and higher

electives and career pathways for many students in small learning communities will require working closely with School-to-Career and **TechBoston** to determine priorities.

Additional drains on resources are the need for new schools. As a result of the Mayor's strong commitment to re-emphasize neighborhood schools and reduce over-crowding, 5 new schools will be built in the Empowerment Zone within the next 5 years. As of March 2001, three of the five schools; two K-8 and one middle school, have been designed and begun construction. The remaining two schools will begin design soon thereafter.

The use of video in our schools is limited. Nearly every school has a cable drop and all of the middle and high schools have the ability to broadcast cable programming through their Whittle system. As new schools are added, it is recommended that coax cable be pulled as a redundant system to the category 5 wiring. It is unclear at this time as to whether the most cost effective data delivery system will continue to be across Cat 5 OR if broadband will be the ultimate delivery system. The potential for video to support teaching and learning, and the potential for that video to come across the desktop, will be explored during the next five years.

Identifying sufficient funding for adequate technical support is our greatest challenge. The industry standard ratio for tech support is one support person for every 50 to 75 users. In a typical business, this tech support person provides assistance to 50-75 users who work exclusively on one computer loaded with a standard suite of software. Contrast this with a school-based tech support person who typically supports computers with hundreds of different daily users who represent a wide range of ages and skill abilities, from beginning kindergarten students to high school seniors. An additional challenge for technical support in the BPS is the decision to support dual platforms, with a mix of Macs and PC's. To further complicate matters, the support staff must adapt to the industry practice of releasing different operating systems and software versions which has impacted every buying cycle since the inception of LINC.

6. ESSENTIAL THREE: TECHNOLOGY SUPPORTS PROFESSIONAL DEVELOPMENT FOR ALL STAFF

The Holland Elementary School is one of Boston's largest elementary schools and, as such, might be expected to find training every teacher to use technology a challenge. Not so given principal and teacher leadership, and the incentive program developed through the LINC Plan. In 1997, a core group of teachers began working with the Holland computer instructor to learn to use technology in their teaching; once these teachers showcased their technology products, they received brand new computers and printers for their classrooms and the word began to spread. Soon, the principal identified space and staff for a second computer lab, the initial group of teachers took on new leadership roles in coaching their peers, and each semester, more than 20 additional teachers asked to be coached by their peers so they too could receive technology for their classrooms. All groups within the school were represented with leadership emerging among regular education, SPED, Vietnamese and Hispanic bilingual teachers. By June 2001, the Holland can proudly report that 100% of their teachers have completed more than 45 hours of training, have new computers and printers in their classrooms, and are exploring additional ways to support student learning with technology.

6.1 Overview

By the year 2003, more than 90% of all BPS staff will have participated in more than 60 hours of technology training sponsored by the Office of Instructional Technology and supported by the Office of Information Systems. Professional development programs are usually developed in-house by Office of Instructional Technology staff who learn from best practices in the district, the state and nationally. OIS and OIT jointly review all content. Additionally, other external partners such as TERC, through a Neir-Tec grant, have helped to shape some of our recent technology professional development focused on Math Investigations and Language Arts.

Our technology professional development programs have multiple entry points and meet teachers and staff at their competency level with the ultimate goal of using technology, as appropriate, to support teaching, learning and administration. Elements of Technology Professional Development are detailed on the BPS web site. Teachers participate in workshops or coaching for a defined period of time and work to support technology as they assume other responsibilities in their school. As technology proficiency increases, an individual may participate in a variety of technology programs. For teachers, nurses and guidance counselors, course participation leads to programs where individuals receive computer hardware for their classrooms and offices. Participants in technology programs have found that as a program ends, a collegial support system remains. This mutual support system has significantly reduced the need for a large centralized tech support staff. In the future this same mutual support system will further the goal of integrating technology with curriculum. As schools develop their Whole School Improvement Plan, they are encouraged to include appropriate technology training based on the readiness of their staff. The peer coaching that has been such a successful part of **LINC Boston** will be expanded in **LINC Boston II** with the goal that by 2006, every BPS teacher will have worked

with a group of colleagues to understand how to use technology to support instruction for all their students.

As part of **LINC Boston**, benchmarks for technology proficiency were created by a team of Boston teachers. The Technology Competencies are to be achieved by all staff and are accessible online for all staff to update as they complete training. The competencies are available on line on the BPS web site and are based on the International Society for Technology in Education (ISTE) standards. The Boston Teachers Union strongly encourages teachers to achieve the competencies and supported the design of the program through which free school-based courses are offered to teachers, principals and other staff to help them achieve competency at each level. The online self-assessment allows users to experience the power of technology to keep track of their own professional development efforts electronically. As outlined n the **MyBPS** Matrix in Section 5.4, expansion of this to an electronic portfolio for all staff is currently planned as part of **MyBPS**. The electronic portfolio will include a record of professional development activity and human resource material as well as other pertinent information.

A partnership has been established with Human Resources, (HR), and the Center for Leadership Development, (CLD), to support new teachers in the use of technology. As part of the hiring process, all new teachers complete a one-page assessment indicating proficiency in novice technology skills. Those teachers who do not have novice level competencies are offered specialized training in basic technology and are referred to the tech support teachers at their school who can assist them with day-to-day technology needs. During the 2001 school year, planning was done with CLD; Simmons and the new teacher-training program to ensure that technology will be embedded appropriately in new teacher orientation and training in the future.

The customization of training by OIT has led to an unintended benefit and unique economy of scale for the BPS. **LINC Boston** had no specific plan to train all staff, yet all staff has benefited both from the benchmarks and the free training initiatives. HIQ Computers, one of our strongest partners, provide trainers and two labs at their headquarters to help Boston achieve this objective. The BPS addresses the technology professional development of all employees, customizing the teacher technology competencies and training models to the specific needs of each department or group. During **LINC Boston** , basic computer training for all staff was "just in time" for the introduction of PeopleSoft. All technology professional development has led to a more skilled workforce in the BPS as all staff support our Focus on Children and the continuous improvement of teaching and learning for all students.

Technology proficiency and, specifically, the use of **MyBPS** and VES, will support professional development in a number of areas. Currently, the Internet is used to announce courses through CLD's online catalog. Email is used to announce courses and communicate enrollment information while listservs are used by different groups, such as the math coaches, to communicate information specific to their needs anytime, anywhere and to foster virtual collaboration. All staff uses the technology self-assessment to update their own technology professional development and to identify their own learning needs. With the development of **MyBPS** in association with VES, it is expected that an individual will be able to update his or her entire professional development plan online. For teachers, the added ability to work on

certifications electronically will be very powerful. Teachers, staff and students use the Internet to take courses online that are not currently available in the BPS. Teams of teachers have piloted a number of Connected University courses and the continued supplement of professional development offerings across the curriculum through online courseware is expected during **LINC Boston II**. The increased use of the Internet to support professional developmental across the district will allow the use of both internal and external resources and perspectives and empower all users in ways no other tools can.

6.2 Goals for the next five years:

Develop and implement a comprehensive plan, including the deployment of MyBPS, for all technology use and support (administrative, including human resources, finance, and instruction) including central office and all schools.

Adhere to a common understanding of technology implementation objectives to support all teaching and learning.

Appropriately embed technology training in all professional development.

Technology Professional Development Timetable:

Novice Level	Intermediate Level	Practitioner Level	Integrator Level	Leader Level
30 hours, Intro Courses	Productivity Coaching, Courses	Curriculum Coaching, Courses	Curriculum Coaches	Pioneers, Leaders
All teachers and staff by 2003	All teachers and appropriate staff by 2004	3900 teachers and all appropriate staff by 2005	1,025 teachers by 2005	225 teachers by 2005

6.3 What every school will achieve through Focus on Children II:

(As outlined in the Focus On Children II document).

- ✓ Every Whole School Improvement Plan will include a detailed strategy for ongoing professional development.
- ✓ These professional development plans will be the result of teachers, school leaders, coaches and other partners collaborating to identify instructional needs.
- ✓ New teachers will participate in intensive, targeted efforts focused on providing the support, guidance, and training necessary to succeed.

6.4 LINC Boston II steps that support Essential Three Goals:

- Increase to 100% the number of teachers receiving 45-hour computer training and coaching to obtain their classroom computer.
- Continue to grow the number of teachers receiving advanced technology curriculum integration training.
- Continue to work with the Curriculum and Instruction Department to appropriately integrate technology into professional development

- Develop processes to insure integration of curriculum and technology professional development – focus on literacy, math and appropriate use of technology.
- Insure that Professional Development is close to the classroom both philosophically and physically; use technology to make just-in-time professional development available in the classroom and at home
- Increase use of on-line courses and use of online resources such as WebQuests to train and infuse technology across the curriculum
- Identify all administrative staff who require basic computer training and deliver it to them in support of BAIS, student assessment monitoring and other administrative applications.
- Establish Coaching model for principals similar to the teacher productivity coach model.
- Institute technology competency requirements for new hires
- Work with Human Resources to offer technology professional development to all staff in support of their job responsibilities.
- Deploy an interactive system, **MyBPS** in conjunction with VES, to allow teachers to search a database of lesson plans and instructional units that have been correlated to the state and citywide learning standards.
- Continue to deploy software and hardware in support of district teaching and learning priorities, consider deployment of resources to specific grades and departments to address specific Curriculum and Instruction programs
- Work with the entire Teaching and Learning Team to support the integration of technology into curriculum for all BPS students and to maximize the use of limited professional development time.

6.5 Challenges to be addressed in achieving those goals:

The joint challenges of limited time available for professional development for instructional staff and the many training demands on all staff need to be addressed as the major constraint in developing a comprehensive professional development program for the BPS. The appropriate inclusion of technology in all professional development will be an essential element in resolving this issue. To accomplish this, a close working relationship must be established among all those supporting professional development in the BPS. Cross-departmental teams must work together to prepare the most effective training to impact teaching, learning and administration. Additionally, studies on the effectiveness of adult training have shown that the most effective programs are delivered in a context close to the environment that the skills are used. It is extremely important that curriculum and instructional technology professional development become integrated to ensure that limited resources are used most effectively.

As technology professional development evolves, the BPS Community must adhere to a common understanding of technology implementation goals to support all teaching and learning. In **LINC Boston**, technology has been deployed as teachers complete course work and schools demonstrate readiness. This has proven to be a very effective approach, insuring that technology resources will be utilized and providing an incentive and reward for teachers to achieve the necessary technology competencies. A negative side effect is that it has not been possible for curriculum developers to assume that across any grade level or academic area there were uniform technology resources available to support new curricula. The BPS must evolve its technology

deployment strategy to allow a closer integration with new curriculum initiatives. Clear expectations for ALL staff and appropriate time to weave technology into their training days is essential.

Funding to support central office technology professional development is also clearly needed. During **LINC Boston**, central office staff benefited from the plan although no funds were ever targeted for that group. For the future, decisions and criteria must be established for funding and training in collaboration with human resources.

7. ESSENTIAL FOUR: TECHNOLOGY SUPPORTS BEST PRACTICES

Across the city, every 10th grade student reads Elie Weisel's book "Night" as part of the required core literature. Thanks to the work of Toni Jackson, a **MetroLINC** Pioneer teacher at the Burke, every teacher will not have to search for her own resources to support her students' understanding of Elie's experience and of the Holocaust. Toni's lesson plans, added to and enriched by the contributions of others, will be available to all teachers as part of **MyBPS**. The site is rich with lessons, activities, and resources. With a click of the button, students can hear and see Elie Weisel in an interview with Oprah Winfrey, review resources on the Holocaust in multiple languages, and build their background understanding of this critical time in our history.

7.1 Overview

Inherent in **LINC Boston** is the belief that Boston Public Schools and its collaborating partners (universities, NEIR-TEC, TERC, EDC, business partners) have great collective understanding of how technology can be used to support improved student learning. With the **LINC Boston II** Plan, Boston Public Schools will create a powerful infrastructure, **MyBPS**, to share best practices, communicate with colleagues, look at student work collaboratively, and build communities of learners, both within BPS and with families and partners.

MetroLINC

Funded by a US Department of Education Challenge Grant, **MetroLINC** has developed a community of technology-using teachers in both Boston and Watertown who have developed substantial understanding of the best use of technology to support instruction, and who also have begun to share that knowledge with their colleagues. A significant outcome of the **MetroLINC** project has been the readiness of Pioneer teachers to share their best practices with others. As one teacher expressed, "The most useful aspect of my **MetroLINC** experience has been the opportunity that I have gotten to see and share in the projects that others in the system are working on." With the development of **MyBPS**, these practices will be more readily shared both within and among schools. Similar interest in sharing best practices has been expressed by administrators. **MyBPS** will also facilitate this work. **LINC Boston II** will advance the sharing of best practices among Effective Practice Schools (a status awarded to 26 Boston Public Schools by School Committee in Spring 2001, and between Effective Practice Schools and the rest of the BPS community. **MetroLINC** teachers and teachers and coaches in Effective Practice Schools will easily communicate with one another to publish their best curriculum units and lesson plans and post those for all to share on **MyBPS**, creating the vehicle for communication among the network of school leaders who are working together to improve practice.

Prior to **MetroLINC**, the district received a federal grant from the Department of Commerce, TIIAP, that focused on using virtual communities to enhance the school to community based collaborations. The TIIAP grant partnered high schools with community based organizations in projects using a common high-speed network for communication, collaboration and the sharing of

best practices. Students at Dorchester High used their newly developed job search and resume writing skills to lead a Job Fair for unemployed adults at the Dorchester YMCA. At about the same time, a group of BPS teachers, as part of an OIT initiative, designed a web curriculum site. Both of these projects informed **MetroLINC.**

Now in its fourth year of a five year funding cycle, participation in **MetroLINC** has helped teachers re-think their classroom practice as they have appropriately integrated technology to support their curriculum. In close alignment with OIT and other curricular district initiatives, **MetroLINC** has developed an infrastructure for teachers to share their best practices with colleagues through workshops, showcases, and coaching via the **MetroLINC** web site found at http://dev.boston.k12.ma.us…type in guest, guest for read only privileges. The **MetroLINC** web site provides a robust environment for collaborative teamwork among teachers. Each participant has a personal workspace, a team workspace and the ability, when ready, to post their work to the community at large. The lessons and activities that are ultimately posted are to be used and modified by their colleagues. As a teacher posts a lesson, a relational database of standards and curriculum frameworks are automatically displayed. Teams collaborate on activities and lessons in virtual communities, strengthened by appropriate face-to-face time through common planning time and classroom visits. The classroom visits have resulted in a number of **Demonstration Classrooms** across the district that may be used as an indicator for Effective Practice Schools. The **MetroLINC** web site and the use of virtual communities to strengthen communication and collaboration will continue to inform the development of **MyBPS** and VES.

Similarly principals and central office staff will use **MyBPS** for collegial support and sharing of best practices. Capturing and disseminating best practices is a time consuming process. Feedback and sharing must be timely and easy to access to be effective. The mechanism created to share best practices to improve instruction can also exist across the district to improve processes and work flow. Increased communication, collaboration and sharing of tools will be extended to administration and central office staff as part of **LINC Boston II**.

Progress has also been made in defining best practices. The use of both qualitative and quantitative data to improve practice has been empowered with technology through our IBM Re-inventing Education Grant. The cross departmental team has worked long and hard to develop a tool that allows teachers to practice scoring student work based on carefully created rubrics. A pilot with middle school math teachers is scheduled for fall 2001.

7.2 Goals for the next five years:

Develop and implement a comprehensive plan, including the deployment of MyBPS, for all technology use and support, both administrative and instructional, for central office and all schools.

Adhere to a common understanding of technology implementation objectives to support all teaching and learning.

7.3 What every school will achieve through Focus on Children II:

(As outlined in the Focus On Children II document).

- The principal and staff will visit classrooms regularly as part of the school's ongoing professional development plan.
- Instructional staff will visit other schools and welcome colleagues into their classrooms.
- Peer coaching and counseling will be institutionalized.
- Common planning time will be used efficiently and cooperatively to look at student work and share best practices.
- Traditional approaches proven ineffective in reaching students will be replaced by innovative strategies with proven results.
- Every middle and high school will adopt two or three agreed-upon best practices to be implemented consistently across disciplines and classrooms.

7.4 LINC Boston II steps that support Essential Four Goals:

- Continue the development of a mechanism for **all staff** (teaching and operations) to identify, replicate and share best practices system-wide as part of **MyBPS**/VES.
- Develop cross-district teams to focus on Curriculum and Instruction tools for **MyBPS** with the state VES project to support the sharing of best practices.
- Expand the use of **Demonstration Classrooms** and pursue alignment as an indicator for Effective Practice Schools.
- Additional opportunities for teaching staff **and administrators** to participate in **MetroLINC**.
- Continue to populate **MetroLINC** lesson plans with content from professional development initiatives

7.5 Challenges to be addressed in achieving those goals:

One of the greatest challenges has been the development of a mechanism to collaborate, communicate and share what works across the district, the state, nationally and globally. Equally challenging is defining best practice. Boston needs a tool that not only shares best practices, but will also enable the user to access both qualitative data obtained through school and classroom visits and quantitative data (district assessments and MCAS results with a focus on progress made in closing the achievement gap) to inform best practice. This tool must confront the major barrier in sharing, which is time. Common planning times, while critical, provide only part of the answer. Technology can enhance face-to-face meetings through the establishment of virtual communities that can be accessed anytime, anywhere. Part of the solution will involve a peer review of best practice prior to posting to the community at large. This element of sharing of best practices continues to be one of the greatest tasks. Boston can not ignore the power of information technologies to help shape and share what students need to know and be able to do in the 21st century. Sharing of best practices requires the BPS to think outside the box and use emerging information technologies as part of the solution

8. ESSENTIAL FIVE: TECHNOLOGY SUPPORTS RESOURCE ALIGNMENT AND USE OF SCHOOL-BASED RESOURCES

In today's competitive job market, the hiring of top quality teachers is a priority for the BPS. In June 2001, a teacher, living in San Francisco, and planning to relocate to Boston, went to the BPS website and learned about Boston's many exciting projects and opportunities. She found the name of an administrator and contacted her and learned of a technology opening at one of our high schools. Within days, she had spoken with the headmasters, and found her skills to be an exact match with the schools' need. She and the headmaster then worked with Human Resources to finish a quick and smooth hiring process.

8.1 Overview

Essential Five mandates that every school will creatively use all funds, regardless of the source, to advance student performance goals. Technology can support the effective management of **staff, schedule and budget** in a classroom, at a school or across the district. Information technology (IT) is an essential tool for streamlining bureaucratic, paper-driven processes; ensuring that consistent, accurate data is readily available to decision makers; allocating and managing resources effectively and efficiently; and enabling the planning and implementation of system-wide change. The benefits – in cost savings and operational improvements – can be enormous. **MyBPS** utilizes the power of technology to vastly improve the management of resources.

Communication and access are at the core of resource alignment. **LINC Boston** provided funding to establish a web presence for the BPS. As part of this presence, a variety of online forms have now been made available to the BPS community. BPS Memoranda for every major department can now be downloaded as Word documents from the web site. The possibility exists with **LINC Boston II** to create an automated environment within **MyBPS** where documents will go beyond static digital copies. For example, the **Whole School Improvement Plan**, **WSIP**, and the rubrics for the **WSIP** currently reside in two discrete Word documents. A goal of **MyBPS** is to have **Instructional Leadership Teams** update their **WSIP** in an on-going basis with the rubrics as part of the automated scoring system, downloading data reports from **LIZA**. **Textbook inventory control** will also be tied into this planning as well. Planning and resources will allow a system within **MyBPS** to automate this process.

Connecting the work that the **Resource Action Team (REACT)** is important. "Boston is one of the few urban districts in the nation that has created an internal/external group to review, analyze and adjust its practice as a routine part of its operation. Using principals and headmasters as its "clients," REACT will make specific recommendations to the Superintendent on improving the delivery of a variety of services, including facilities management, operations, contracts, collective bargaining, school and central staffing, budget and student assignment." (Focus on Children II)

8.2 Alignment of Operational and Administrative Resources to Support Student Performance

The **LINC Boston II** plan is intended to be a comprehensive plan, recognizing that all technology elements – administrative systems as well as instructional systems and technical infrastructure – are essential to achieve the vision expressed by **My BPS**. It is clear that the district's resource alignment in the areas of administrative technology, human resource management, financial management and facilities management directly impacts the ability of each school to align its own resources effectively. Great strides have been made in all of these administrative areas during the time **LINC Boston** has been implemented. While **LINC Boston** did not provide direct funding for these administrative technology developments, the success is directly tied to the building of the network infrastructure and to training-based training, the major **LINC Boston** expenditures. Alignment of all plans, administrative as well as school-based, with technology goals, is essential as we move forward.

Four years ago, the City of Boston decided to seize the opportunity that **LINC Boston** was creating by replacing a fragmented set of administrative systems with an integrated suite of **PeopleSoft** applications for financial and human resource management. The BPS was an active participant in the citywide BAIS (Boston Administrative Information Systems) Project, and also has taken additional steps to meet some of its own unique needs for human resource, financial and facilities management.

Human Resource Management

BPS employees are the critical first line for success in whole school change. Human resource (HR) process improvements, coupled with technology enhancements, have improved central administrators' ability to quickly and effectively respond to school need by managing personnel more efficiently. Through the BAIS project, the BPS acquired new software applications for staffing, compensation and benefits and payroll processing, and an additional system upgrade is planned for early 2002.

Further improvements to systems supporting day-to-day HR functions are planned. For example, upgraded payroll processing software will simplify the task of timekeeping and enhancements to the BPS' substitute teacher system will facilitate the task of ensuring that every classroom is staffed by a qualified teacher every day. HR information management also will improve with the planned move from paper to electronic file systems and the development of better reporting tools for use by school and central administrators.

Financial Management

The allocation and management of financial resources by individual schools and the overall system is an ongoing challenge. Accurate, consistent data and easy-to-use analytical tools can greatly improve the quality of decision-making and new and better systems can streamline financial processes. The BPS has made progress on both these fronts in recent years by adopting the City standard for financial software as well as for budgeting and purchasing systems (**Hyperion**).

The BPS' budgeting and purchasing systems now provide much more timely and useful information for annual planning and routine reporting of school-based and system-wide budgets. The speed and ease of performing those processes - including school-based budget management, system-wide planning and reporting, and the interface between BPS and City departments - also have improved. In coming years, continuing attention to data quality and system interfaces will be required.

The new purchasing system is transforming a slow, paper-driven process into one where schools needs for supplies and equipment and can be met quickly and cost-effectively. School administrators can now submit requests and track the status of their orders electronically, and a comprehensive view of purchasing needs and options allows the central purchasing department to maximize the BPS' buying power and save money. Further process improvements are anticipated in coming years.

Facilities Management

Approximately 63,000 Boston Public School students spend their schools days in about 131 school buildings that aim to provide a safe, productive and educationally appropriate environment for teaching and learning. These school buildings, as well as other support facilities such as parent information centers and administrative offices, must be planned, maintained and renovated or replaced as needed in a cost-effective manner.

The BPS is currently updating and upgrading a large collection of databases, architectural drawings and analytical reports that provide information on building condition, estimated costs to upgrade facilities, levels of handicap accessibility, programmatic use of classrooms and square footages for all areas. The data will be contained in a cutting-edge, web-based facility information management system, available to administrative and school-based personnel via **MyBPS**. This School Facility Inventory System (SFI System) is targeted for completion in 2002.

SFI System users will be able to zoom in on maps or floor plans and, by selecting anything from the entire school district down to a specific classroom in a particular school, gain access to a wide range of facility and program information. This will enable them to more quickly and effectively address a host of needs such as:

- Evaluation of school bus pick-up and drop off areas
- Planning for additional classes in a school
- Analysis of school renovation options
- Installment of new technology infrastructure
- Tracking of CIPR (Capital Improvement Project Request) priorities
- Reviewing the handicapped-accessible evacuation routes in a school

8.3 Alignment of School-based Technology Resources to Support Student Performance

Boston students themselves need access to a range of technologies, from graphing calculators and AlphaSmart keyboards, to multi-media computers, with each technology chosen to fit the task at

hand. Most classrooms currently have at least one computer and a printer. Through **LINC Boston II**, all classrooms will have computers and sets of smaller devices available to them, as well as access to a computer lab and a library for all students to learn new skills and to complete final projects. Computer instructors will teach new technology skills as tools to support learning in core content areas (e.g. spreadsheet as a support for data collection and analysis in math or science). Computer Instructors will also support classroom teachers as they integrate technology into their teaching. The school library will serve as the information hub of the school, with both print and technology available to students and staff, and with the Librarian assuming a key role in support of literacy development. Each school will work with the Office of Technology Support Specialist to assess their individual needs and appropriately align resources to support improved student performance. This alignment will involve assessing how best to use internal technology resources, the computer lab, the library, classroom computers and school personnel.

Role of the Computer Teacher and Computer Labs

At the beginning of **LINC Boston**, computer labs were the only source of computer instruction and that instruction was in basic skills. As **LINC Boston** has evolved, increasing numbers of teachers (currently 80%) have at least one computer in their classroom, and are beginning to use technology to support curriculum, as well as continuing to use the computer for their own productivity (creation of assignments and tests, communication with parents, etc.). Most classroom teachers, however, still do not have the time or training to teach computer skills such as word processing, spreadsheets or presentation software, but want their students to have these skills so they can incorporate their use into their instruction. To meet this need initially, for the first years at least of **LINC Boston II**, computer instructors will teach new skills to students in the computer lab, as well as support students as they complete final products. Increasingly, computer instructors will work with classroom teachers to develop and support curriculum projects that use technology as a tool. The computer lab will continue to be the place where there are sufficient computers for all students to work on projects at the same time. Oversight and management of this lab will continue to be an essential role within the school. OIT staff will continue their focus on Computer Teachers and conduct workshops were the instructors themselves develop and implement curriculum units that are jointly planned and implemented with subject area teachers.

Role of Library/Media Centers and Librarian

At the outset of **LINC Boston** , most librarians had outdated print collections and little or no technology. With the support of BPS funding, all high school libraries were brought into compliance with the New England Association of Schools and Colleges accreditation standards, and elementary and middle school libraries were wired, outfitted with computers, and received some funding for expanded print collections. A major priority of **LINC Boston II** will be to support the growth of elementary and middle school libraries so they become a major resource in the literacy work of our schools.

All high schools, and ten elementary and middle schools now have automated catalogs connected to the Boston Public c Library. An additional ten elementary and middle schools are automated with the Winnebago System. As part of **LINC Boston II**, all Boston Public School Libraries will receive expanded resources and catalog automation.

Currently, all high schools, two middle schools, and four elementary schools have fulltime certified librarians. The remaining schools have part to full time library paraprofessionals, many of whom have years of experience and have developed excellent understanding of the role of the library in a school. Others are relatively new to the job and are receiving on the job training from the Center for Media Technology. One of the goals of **LINC Boston II** is to create a strong professional development program for these library paraprofessionals so they can assume more substantial professional roles in the schools. More information on the Library/Media is on the Web Site at **http://campbell.bostonl.k12.ma.us/av**.

8.4 Goals for the next five years

Develop and implement a comprehensive plan, including the deployment of MyBPS, for all technology use and support, both administrative and instructional, for central office and all schools.

Develop and adhere to a common understanding of technology implementation objectives to support all teaching and learning.

Develop and adhere to a shared understanding of the role of libraries and computer labs as information technology and library resources in schools.

Develop and adhere to a shared understanding of the role of computer instructors and librarians as information technology and library resources in schools.

8.5 What every school will achieve through Focus on Children II:

(As outlined in the Focus On Children II document).

- ✓ Develop **MyBPS** to enable every school and the district to creatively use all funds -- regardless of the source -- to advance student performance goals.
- ✓ The school's structure and schedule will be continually refined to support the learning goals.
- ✓ All specialized staff will function in support of the school as a whole.
- ✓ The school will develop a strategy to pursue additional external funding.

8.6 LINC Boston II steps that support Essential Five Goals:

- Automate **WSIP** to allow **Instructional Leadership Teams** to update in an ongoing basis
- Connect to the work of the **Resource Action Team (REACT)**
- Use technology to streamline and automate routine school administrative processes.
- Deploy system upgrade of BAIS.
- Evaluate possible upgrades of Hyperion Software to support improved financial management.
- Deployment of the School Facility Inventory System.
- Continue to provide specialized training to Computer Teachers K-12.
- Work with Technology Committees in every school to maximize the use of their computer labs and library/media resources.
- Adoption of library curriculum, K-12, by the School Committee.
- Provide focused technology and media literacy training to library/media center staff.

- Work towards staffing middle school and elementary Library/Media centers with certified library teachers.
- Develop Media Literacy lesson plans and instructional units that supports the new curriculum
- Continue to develop partnerships with the Boston Public Library.

8.7 Challenges to be addressed in achieving those goals:

Boston has built a network that will support the sharing of information from classroom to classroom, school to home, and school to the world beyond. The challenge in the next five years will be to develop a system that supports more effective use of this network for **learning, communication, collaboration and management.** Boston must commit resources to the development and implementation of **MyBPS** to house and integrate school- and district-level data on students, curriculum, finances, human resources, and facilities. All BPS students and staff will have their own unique "space" in this learning network, and will use their "virtual space" to conduct the work of teaching and learning. Full access to this space will require the city and its business partners to bring high speed Internet access to all parts of Boston.

The staffing changes required to bring about this paradigm shift in education will present multiple challenges. Boston must prepare itself to think differently about the business of education, and, by extension, about the changing roles of educators and administrators. As the role of the teacher evolves from "sage on the stage" to a facilitator in the lifelong learning development of the student, staff roles will also evolve. As Chris Dede from Harvard describes, "the impact of information technologies have altered the nature of work and citizenship, [and] the skills and concepts students must attain to be productive adults in the 21st century society are changing." While the need for literacy and an understanding of mathematics will always remain, how we approach these, and other vital core subjects, will be profoundly affected by changing technology."[R]apidly evolving information devices, tools, media, and infrastructures are transforming what we learn, how we acquire this knowledge, and the processes by which we evolve our educational institutions." In a key example of this kind of shifting, the BPS will have to rethink the implementation of the K-8 library curriculum which has a strong emphasis on having our students understand how to effectively evaluate all of the information with which they are bombarded via print, Internet and media. It will be essential that all teachers and librarians incorporate information literacy in their teaching.

9. ESSENTIAL SIX: TECHNOLOGY SUPPORTS FAMILY AND COMMUNITY ENGAGEMENT

In May 2001 Krista and her daughter Katie graduated from **TGH** Allston Brighton Community Computer Collaborative and brought home their new computer system. Krista started the program without knowing how to turn on the computer or even use a mouse. Now, she can save files, format text in Word, send Emails, and find information about a topic on the Internet. In her application to **TGH**, Krista wrote the following in her family goal statement:
"I would like to learn more about computers, because of the job I'm in. I work at Brigham & Women's Hospital. There are jobs I am not qualified for due only to computer skills. I am a single parent. I've been back to work now for 2 years. I was on AFDC before that. I'm a quick learner and I'm intelligent. I want to better myself to be a good role model for my three children. They're bright, outgoing kids. I want them to have the same opportunities other children have. And I will work hard to achieve the best for them."

9.1 Overview

Families, community based organizations, and business partners represent the largest untapped resource for whole school improvement. In some schools, such as the Quincy Elementary School, the Timilty Middle School and Boston Latin School, parents, business partners and community based organizations work collaboratively to support all students both in and out of the classroom. An essential for improving those connections in every school is giving students and families access to all the tools they need to support student learning. Prior to **LINC Boston**, very few families had computers, let alone Internet access, at home. Today, approximately 30% of Boston students have computers at home. This percent varies considerably from school to school, and tends to increase as students reach high school age.

Increasing this access is a major goal of the City of Boston and of Mayor Menino. A technology task force composed of representatives from the Mayor's Office, School Department, Libraries, and Community Centers meets weekly to plan and implement programs to ensure that, by 2003, students and staff will have sufficient access to the Internet, which will enable them to work outside the school day. The City of Boston has made a substantial commitment to providing access to students at libraries and community centers, as well as in schools after regular hours. The partnerships established through the LINC Plan have positioned Boston well to greatly reduce the Digital Divide in all its neighborhoods.

The **Boston Digital Bridge Foundation** is a stellar example of a family engagement partnership with roots in **LINC Boston.** Founded by Echo Tsai, President of HIQ computers, and one of **LINC Boston**'s strongest partners, "the mission of the **Boston Digital Bridge Foundation** is to bring together multiple parties who, working together, will leverage digital opportunities to create and support a highly trained and skilled workforce that will benefit Boston families and businesses throughout the Boston metropolitan area. Computer technology is the foundation of the modern world economy. In order to participate in this new economy, American workers must be able to work with technology. In order to succeed domestically and internationally, American companies

need skilled employees. Working together, we can provide skills and jobs to people who need them and build the quality workforce that is so crucial to business success." (taken from web site, http://techboston.org/daily/mdbf.htm)

One of the many programs supported by the **Boston Digital Bridge Foundation** is **Technology Goes Home**. The mission of **Technology Goes Home, TGH**, is to help adults prepare for employment opportunities and to help children improve academic performance by bringing technology into the homes of low-income families. In the program's intergenerational training sessions, one adult and one child (5th grade or older) from each family are paired together. A total of ten families attend. In many cases, the student is already familiar with the material as a result of the skills they have gained through **LINC Boston** participation, and is able to help train and assist their parent. Most families say that this type of training is the most unexpectedly beneficial part of the program. Not only do families learn more about technology at a faster pace this way, but they also end up becoming closer as parent and child.

Technology Goes Home organizes **Neighborhood Technology Collaboratives**, NTC, composed of coalitions of community-based organizations, that select participating families, provide training, computer lab space and ongoing support. **TGH** currently operates in the Codman Square, Allston-Brighton, Mission Hill, Fenway, Grove Hall, Uphams Corner, Dudley and Lower Roxbury neighborhoods. Every family that successfully completes the training program is provided with a personal computer, a modem, a printer, and free Internet access.

The success of many of the **LINC Boston** partnerships has led to the need for Technology Parent Outreach Coordinators, whose role is to increase parents'/guardians' awareness of, and participation in, the evolving technology landscape in their child's school. These positions were also created in part as a response to the Parent Involvement Policy adopted by the district. During the Winter of 1999, two **Parent Outreach Coordinators** were hired by the Office of Instructional Technology.

The Technology Coordinators conducted a survey of all schools to assess their degree of family technology access. The results of that survey have been used to formulate strategies to encourage family participation in school-based computer courses, participation on School Technology Committees and improved home-school communications. In fall 2001, the Coordinators will be working with school-based parent support staff at selected

Another way of increasing family awareness of technology is through a Parent Technology Newsletter, which contains educational web-site addresses, information on MCAS, technology training opportunities in the community and information on student technology competencies. The Newsletter is updated as appropriate and is forwarded to schools via the Tech Support Teachers and school-based parent coordinators.

Technology presentations at the Annual Citywide Showcase of Schools and at parent meetings also provide the grassroots, face-to-face work that is important to help all BPS families understand the technology resources available to them.

9.2 Goals for the next five years

Develop and implement a comprehensive plan, including the deployment of MyBPS, for all technology use and support, both administrative and instructional, for central office and all schools.

Develop improved communications with parents and families, students and the community at large.

Scale and replicate Technology Goes Home by creating partnerships between TGH Neighborhood Technology Collaboratives and individual schools.

Develop a citywide mechanism for improved communication with families, community based organizations and business partners as part of MyBPS.

9.3 What every school will achieve through Focus on Children II:

(As outlined in the Focus On Children II document).

- ✓ School Site Councils will compose and sign a School-Family Compact.
- ✓ A family liaison – based on models developed through the Boston Annenberg Challenge and others – will help strengthen ties among schools, families, community organizations and central offices.
- ✓ The Instructional Leadership Team and School Site Council will include a diverse group of parents and community members reflective of the student population.
- ✓ Schools will use a variety of strategies to help families and partners feel welcome, invited, appreciated and engaged in the education of children.
- ✓ Principals and teachers will be trained in communicating effectively with families, including sensitivity to cultural and language differences.
- ✓ Principals and headmasters will be held accountable for setting goals and developing strategies to engage families and partners in the schools.
- ✓ Strong partnerships between schools and a variety of businesses, universities, human service providers and cultural institutions will support the schools' performance goals.
- ✓ Schools will work closely with the Mayor's 2:00-to-6:00 After-School Initiative, the City's Office of Community Partnerships and other resources to engage students in educational and social activities beyond the school day.

9.4 LINC Boston II steps that support Essential Six Goals:

- Develop program to provide **TechBoston** students with internships at community based organizations to provide students with work experience and CBOs with support resource.
- Create a formal program to open computer labs at selected schools to CBOs with appropriate guidelines to ensure security and integrity of school resources.
- Develop program to facilitate schools' participation in **Technology Goes Home** program to increase the availability of computers to students outside normal school hours.
- Continue to build links with the Boston Public Library.

- Provide hands on assistance to school-based parent coordinators to use technology to empower the parent communication and involvement.
- Pursue the use of the Virtual Education Space, VES, initiative to provide a communication vehicle to give parents a rich assortment of information on their children's educational performance.
- Collaborate with the Digital Bridge Foundation to expand access to technology for all Boston students and families.

9.5 Challenges to be addressed in achieving those goals:

It is beyond the scope of **LINC Boston II** to plan and implement a program to provide technology for every student and family in the City of Boston. However, it is abundantly clear that access to technology beyond the school day is critical to the success of the student during the school day and to that family as part of the 21st century. It will be important to build coalitions to address this need. In addition, it will be essential that BPS work with the many after-school and summer programs housed in our schools to develop and implement guidelines for effective use of technology.

10. EVALUATION

10.1 Overview

Boston, as well as every other Massachusetts city and town, must develop a district technology plan in order to qualify for state and federal funding. Boston Public Schools has gone far beyond this requirement to engage all schools and central office departments in thoughtful planning for the use of technology to support all the work of the Boston Public Schools. This engagement has resulted in the development of a number of initiatives to use technology to improve teaching and learning. Foremost of those is **LIZA**, an on-line database of student information, including attendance, standardized test scores, grades, transportation, health information, and other important data. This tool, updated daily to reflect student transfers, is currently available to all principals and will be available to teachers in November 2001. During LINC II, Boston Public Schools will build upon **LIZA** to develop **MyBPS**, an Intranet portal customized for every member of the BPS community to include all the tools needed to do one's work. In each stage of development, schools and central departments meet together to identify needs and to build or purchase the tools necessary to address those needs. In their planning, participants always keep the following key question at the forefront of their thinking:

How can technology improve education and impact student performance?

To examine adequately the implementation and outcomes of **LINC Boston II** an evaluation design that addresses both implementation and program quality has been developed. To provide a full range of information, it examines the program from both a formative and a summative perspective. The formative evaluation component measures the Plan periodically for the purpose of improving the program as it progresses. It is a mechanism that allows for fine-tuning of the program to ensure that it addresses the developing needs of the stakeholders while remaining true to the original objectives. In contrast, the summative evaluation occurs at the end of the project and employs standardized test scores, grades, attendance, interviews, and surveys. The focus of this type of evaluation is to determine whether or not the program has effectively met its objectives. This combination of formative and summative evaluation aspects will provide a vehicle by which the plan will be regularly reviewed as well as a determination of ultimate effectiveness.

Evaluation of the LINC Plan is approached in a number of ways;

1. Measurement against State Technology Benchmarks and the national CEO Forum Assessment,
2. Specific evaluations of state and federal technology grants by outside evaluators,
3. Specific evaluations of courses, programs and projects,
4. District-wide requirement of an evaluation component for pilots of new technology programs and/or the use of new software and hardware.

5. On-going meetings and feedback from multiple advisory boards and stakeholder meetings.

Each of these measures is further described below:

1. State Technology Benchmarks and CEO Forum

Both the State Technology Benchmarks and the CEO Forum on Education and Technology, provide frameworks (checklists) of those conditions deemed essential, through which the district can measure its progress in achieving appropriate levels of technology implementation and training to impact student performance. The State Technology Benchmarks are described by David P. Driscoll, Commissioner of Education in a letter to districts dated March 2001, "These standards were devised by the Department, in consultation with a working group of district technology specialists from across the state. The benchmark standards represent the **minimum conditions** that should be in place in each district in order for technology to play a meaningful role in raising student achievement. They were provided to help districts set goals in their local technology planning, and we encourage all districts to meet these goals by the year 2003." Boston currently is on target to meet every benchmark with the exception of technology support. Boston is also required to complete yearly reports that document growth against these benchmarks in order to continue to receive state and federal funds. The benchmarks can be viewed at http://www.doe.mass.edu/edtech/.

The CEO Forum takes a more global approach to the evaluation of technology use in public schools and utilizes the most current and best information available on schools and technology use across the country. "The CEO Forum on Education and Technology was founded to help ensure that every child in the United States is equipped with the essential technological, critical thinking, and communications skills necessary to compete in the 21st century." (CEO Forum Web site, 9/8/01) The CEO Forum has developed it STaR Chart, (School Technology and Readiness), to help districts measure their progress as they prepare their students for the 21st century. Early Tech, Developing Tech, Advanced Tech and Target Tech are the four school profiles which have been aligned with possible performance outcomes. Indicator categories include hardware and software, professional development, digital content, and student achievement and assessment. A quick look at the StaR chart leaves no question that these indicators are in clear alignment with the Six Essentials of Whole School Improvement developed by Boston Public Schools. The implementation of **LINC Boston** has enabled the majority of Boston schools to approach the Advanced Tech category. View more information on the CEO Forum, reports and charts at http://www.ceoforum.org.

2. Specific Evaluations of State and Federal Technology Grants

All state and federally funded grants require specific evaluations. **MetroLINC**, a federal Technology Innovation Challenge grant, has provided major support for the successful implementation of **LINC Boston. MetroLINC** has also addressed questions specifically related to the role of technology in improved teacher performance and also in improved student performance. The **MetroLINC** evaluation addresses three major research questions:

1. To what extent have teachers used the resources and support provided through participation in **MetroLINC** to implement curriculum integrated with technology?

2. Has participation in **MetroLINC** resulted in changes in:
    - Classroom practices around technology?
    - Teachers' professional growth and support?
    - Teachers' leadership capabilities around technology?

3. What has been the impact of **MetroLINC** on teachers' continued use of technology with students? Is the impact on teachers evident even a year or two after participation in **MetroLINC**?

The **MetroLINC** evaluation uses a wide range of methods for gathering data, including face-to-face interviews with **MetroLINC** teachers and program staff, observations of key program events and meetings, and written surveys.

3. Specific evaluations of courses, programs and projects

Every course, program, and project undertaken as part of **LINC Boston** has an evaluation component, often as simple as a teacher feedback form. This feedback is used to constantly improve delivery methods and discontinue programs that are not directly aligned with the larger curriculum initiatives.

4. District wide requirement of an evaluation component for pilots of new technology programs and/or the use of new software and hardware

The Superintendent has mandated that **ALL** use of new software and hardware to support improved student performance be piloted prior to system-wide purchase and implementation. At a time when stakes are high with MCAS and other standardized testing, large numbers of companies and organizations have approached the BPS with products and promises to improve student performance. It is essential that these products be evaluated before precious dollars are spent for unknown outcomes. This policy of prior evaluation is intended to continue the alignment of resources and the appropriate use of tested technology applications. Good teaching, with a variety of tools, including technology, continues to be the best method for improved student performance.

5. On-going meetings and feedback from multiple advisory boards and stakeholders meetings

An important component of the **LINC Boston II** evaluation strategy is consistent feedback from advisors and stakeholders. In November 1994, the Mayor appointed a special Blue Ribbon Commission with the charge of creating the first technology plan. Many of those advisors have continued to support both the LINC Plan and **TechBoston**. Other newer partners have joined, providing valuable input and feedback as plans and programs evolve. In September 2001, the Mayor convened a second high-level advisory group to guide **LINC Boston`II**. Additionally,

focus groups of more than 70 stakeholders representing teachers, principals, students, parents, community based organizations, higher-ed, businesses and city and state government, were convened to discuss the on-going development of **LINC Boston II**.

10.2 Challenges

Boston has made a strong commitment to effective evaluation of all technology programs. To implement this successfully, sufficient funding and staffing will have to be identified. Enforcement of the superintendent's mandate that all hardware and software is tested prior to adoption will also provide a major challenge. Companies and organizations approach individual principals to offer support, sometimes free for a period of time, but after that with a significant price tag. It will be essential that all of these offers are "vetted' prior to implementation to ensure high quality use of technology.

Given the multiple evaluations of pilots, courses, projects and small programs within the **LINC Boston II** framework, a key challenge will be one of alignment. It will be critical that the evaluations are designed, aligned and implemented so that they provide feedback to the particular program evaluated, but also to the **LINC Boston II** plan as a whole.

11. BUDGET

11.1 Overview

In the first five years of the LINC Plan, significant investment was made in networking schools, upgrading electricity, and buying hardware and software. Nationally, the majority of technology investment over the last five years has also gone to hardware and infrastructure. The estimated total cost of **LINC Boston** was $145 million (See Chart I, **LINC Boston** Five Year Budget Revenues). Of the $145 million, $65 was Federal Erate funding. Boston is to be commended for its successful identification of e-rate funding that has given Boston a network in each of its 131 schools at a considerable savings. An additional $30 million was captured through state and federal grants and partnerships. Boston was able to capture these resources due to the commitment of City Capital and the creation of **LINC Boston**, which was unanimously passed by School Committee in June of 1996. **LINC Boston** was successful in identifying multiple funding sources to support its ambitious plan

The total estimated cost of **LINC Boston II** will also be significant at $123 million. **While the total funds needed will be less, sufficient funding must be allocated to replace obsolete equipment, to build and maintain MyBPS, and to continue and expand the technical and programmatic support needed to use technology effectively.** We anticipate that 51% of all resources will come from external sources; e-rate funds (41%) and grants and partnerships (10%). We believe that 10% funding from partnerships and grants, approximately $12.2 million, is a conservative estimate. The remainder will come from city funds. However, this is a framework and with the plan in place, Boston will continue its aggressive all funds approach to supporting the plan.

Capital Funds

Two million dollars per year in uncommitted funds is needed for new computers and printers to replace obsolete equipment for FY03-06. Major infrastructure funding is also needed to complete the network. While all schools have internet access and 77% of our classrooms have at least one internet connection, 58 schools still need electrical upgrades and additional network drops in classrooms. The e-rate will pay for 90% of the technology work. The electrical infrastructure is not reimbursable and represents the largest share of the cost. Many of our older school buildings have extremely outdated and often dangerous electrical systems. Electrical upgrades are not only necessary for technology infrastructure, but are truly needed for general building upgrades. The total capital funds for the electrical upgrades are in excess of $24 million.

GSP

New application development, primarily **MyBPS**, integration and support require $850,000 per year in uncommitted GSP funds for FY02-06. The BPS is looking both internally and externally for a 3% increase in funding to support all of the technical work. It is hoped that the efficiencies created through the development of **MyBPS** will offset current expenditures in a number of other areas such as textbooks and facility planning.

E-rate

$37 million in e-Rate funds are needed during the first three years of the plan to complete the remaining 58 schools. Indications are that the current federal administration will not attempt to change the funding rules for internal connections at least until FY04. Telecommunciations discounts at the 90% level will be available to Boston at least through FY06.

A number of charts and budget projections follow that indicate a framework for spending that support **LINC Boston II**. It is important to note that budget assumptions are based on current economic conditions. As with **LINC Boston**, budget adjustments will be made as mandated by changes in the economy.

11.2 Challenges

In identifying resources for **LINC Boston II**, it will be important to work with the federal and state governments, external partners, and other funders to achieve the ambitious goals of the Plan. Alignment of resources with a common understanding of technology implementation goals is critical as we move forward. With the increase of training and enthusiasm for technology, schools have begun to make their own purchases of technology over and above allocations from the Plan. For **LINC Boston II**, it is suggested that an all funds approach be required and that schools and departments who wish to implement additional technology programs ensure that all funding guidelines have been followed. Schools and departments will be asked to share in the funding of specific programs and initiatives to support improved student performance as part of **LINC Boston II**.

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